

An Analysis of Instrumental Jazz Improvisation Development

Among High School and College Musicians

By

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DEDICATION

To my parents, who introduced me to the wonderful world of music at a young age, my fascination with improvisation comes from your encouragement of creativity and play.

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ABSTRACT

The purpose of this study was to examine the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement. Participants included 26 high school and 44 college instrumentalists with varying degrees of jazz improvisation experience. Data collection for this study was conducted using four researcher-designed measures: (a) Participant Improvisation Experience Survey (PIES), (b) Improvisation Achievement Performance Measure (IAPM), (c) Aural Imitation Measure (AIM), and the (d) Jazz Theory Measure (JTM). Results indicate that aural imitation ability and technical facility serve as fundamental skills for improvisation achievement. Other factors significantly correlated with jazz improvisation achievement include improvisation experience, jazz experience, practicing improvisation, perceived self-confidence, self-assessment, and jazz theory knowledge. Further analysis of results led to improvisation achievement being viewed from a developmental perspective and jazz improvisers being distinguished from one another on a developmental continuum (i.e., novice, intermediate, advanced) based on performance evaluations within musical categories (i.e., rhythm/time feel, harmony, melody/rhythmic development, style, expressivity, and creativity).

CHAPTER I

INTRODUCTION

{...}After the opening ensemble chorus came the customary two-bar break; and then Bix, crossing one leg over the other knee, halfclosed one eye, his gaze focused somewhere outside the solar system, and sliced into his first solo.

Tears started to my eyes, a lump into my throat as big as a pear. It wasn't one more white facsimile of King Oliver or Freddie Keppard or any other superb New Orleans trumpet player; it certainly wasn't remotely like young Louis Armstrong's exultant fireworks – it was, if anything, the exact opposite. In fact, it was unlike anything I'd heard in jazz. It was itself: sui generis.

Superimposed on its hot, swinging beat was a coolly logical structure coherent in form as a Mozart sonata, a crystal lattice seen under an electron microscope. The melodic line had a beginning, a middle, and an end; the beginning moved, like Act One of a well-made play, straight toward its logical climax in Act Three; the beginning implied the end, the end was an inevitable comment on the beginning. Within that structure each part implied the whole, each individual phrase partook of the same cool, consistent style, each partial episode had its own little surprise denouement – and all of it fitted together like – I was about to say like a fine Swiss watch, except that in its inspired blending of the ingeniously intricate and beautifully simple there was

nothing of the mechanical; its symmetry was functional, organic, the symmetry of a seashell, of something just born and never to be duplicated, like a new daybreak, each idea flowing as inexorably out of the previous one as the sequent rills in a running brook, effortless and graceful as the motion of a waterfall, a field of grain ruffled by a breeze. (Berton, 1974, pp. 123-124)

This excerpt from Ralph Berton's book *Remembering Bix* richly describes the art of jazz improvisation as heard and interpreted by the author at a young and impressionable age. The trumpet player, Bix Beiderbecke, was a legendary figure in the early jazz tradition of the 1920's, known for his unique improvisational ability that captivated audiences and fellow musicians alike. His ability to seamlessly weave together musical motives into melodic lines with a symmetry that resembled "a seashell" and perform it in a way that sounded all together new, is an example of expert-level improvisation or *personal improvisation* (Kratus, 1996). At this level, the musician has mastered a particular musical style (e.g., jazz) and is able to transcend its boundaries to create a new style. Thus, Beiderbecke transcended the stylistic characteristics of his contemporaries (e.g., King Oliver, Freddie Keppard, and Louis Armstrong) creating his own sound and style. His artistic contribution pushed the boundaries of 1920's jazz and elevated his stature among the jazz musicians of that era (Berton, 1974). Yet, how did he develop this ability? Considered more broadly, how does any jazz musician develop the ability to improvise? How might this be empirically studied and measured?

The Development of Jazz through Improvisation

The roots of jazz and its improvisatory nature can be traced back to Africa. Songs, instrumental techniques, repertoire and dance were all learned informally through observation and imitation. Once in the United States, African-Americans retained these performing traditions, adapting them to new forms of music such as the spiritual, the work song, and the blues, thereby creating the foundation for jazz (Campbell, 1991). "Improvisation is generally regarded as an aural process; while ideas for jazz improvisation are derived from sketches or skeletal frames of notation, aural inspiration frequently takes precedence over the written note, giving jazz its characteristic quality of free expression" (Campbell, 1991, p. 177).

The jazz style developed from the fusion of rhythmic and vocal influences of African-American culture with harmonic function and instrumentation of European music, portraying the complex identity of a diverse populace. "Historically, jazz was an expression of life itself, and the spirit of life – its victories and defeats – was thus reflected in the music" (Campbell, 1991, p. 177).

Unlike any other traditional form of music taught in American schools, jazz is unique primarily because of improvisation. It depends on sophisticated knowledge of repertoire, style, technical expertise, and the ability to interact with others to create music in the moment. No two performances of the same piece of music will sound alike; the heart of a jazz song consists of the musician's improvisation, an expression of his or her knowledge, skill and life experience. This is the value of jazz music to the musician and to the listener: the opportunity to express and to feel something different in each performance.

Learning Jazz Improvisation

In its early days, jazz education occurred “on the bandstand” and in the informal environment of the club, dancehall, and theater (Dobbins, 1988). Musicians learned how to improvise by observing and imitating others. Today, much of jazz education takes place in schools, using a combination of codified notation materials (Aebersold, 1967; Baker, 1980; Coker, Casale, Campbell, & Greene, 1970; Reeves, 2006), recordings, theory training, private instruction, and ensemble experience. As a result, the teaching and learning of improvisation has become much more systematic.

Despite the development of a wide range of instructional approaches to learning jazz improvisation, understanding the sequence of improvisational development, from novice to advanced stages, has not been systematically explored. Studies of improvisers of varying levels have been conducted (Berliner, 1994; Biasutti & Frezza, 2009; Norgaard, 2011), but they predominantly focus on expert-level improvisers for the sake of better understanding the improvisational process. In addition, theories of cognitive processes of improvisation have been proposed (Berkowitz, 2009; Johnson-Laird, 1988; Kenny & Gellrich, 2002; Pressing, 1984, 1988). Using information processing theory and cognitive psychology, these authors suggest that the development of improvisational expertise depends on a musician’s knowledge base, memory, technical fluency, and the ability to work within a variety of constraints. Other characteristics that play a role include anticipation of musical events, the ability to communicate emotionally with listeners, the importance of internal and external feedback, as well as the experience of a “flow” state while

improvising. Such findings indicate that improvisation is a complex, multidimensional process.

Findings in Improvisation Research

Since the 1960's, improvisation has steadily grown as an important practice in music education, and is now formally recognized as a core competency in music education (Consortium of National Arts Education Associations, 1994). Research on improvisation has steadily grown with this expectation. Results have indicated that as children grow older, their improvisation becomes more purposeful and complex, including the use of motives, referents, and phrase structure (Brophy, 2005; Flohr, 1978; Kiehn, 2003; Mang, 2005; Moorhead & Pond, 1978). Improvisers draw upon a wide storehouse of knowledge (e.g., referents and musical skills) when improvising (Beegle, 2006; Mang, 2005; Moorhead & Pond, 1978; Norgaard, 2011). Intentional teaching strategies and curriculum focused on improvisation are effective for developing improvisational skill (Azzara, 1993; Burnsed, 1978; Guilbault, 2009; Heil, 2005). The inclusion of improvisation in instrumental study enhances performance (Azzara, 1993; McPherson, 2005), positively affects development of creative thinking (Kiehn, 2003), and is meaningful to students who improvise (Burnsed, 1978;). Singing and playing an instrument or multiple instruments positively influences improvisation achievement (Heil, 2005; McPherson, 1993) as does jazz theory knowledge, self-assessment, aural imitation (Ciorba, 2009; May, 2006) and jazz experience (Madura, 1996). Expert-level improvisation involves sketch planning, evaluative monitoring, a rich knowledge base, harmonic and melodic directive influences, and excellent recall/memory skills (Norgaard, 2011).

Improvisation may (Azzara, 1993) or may not (Burnsed, 1978; Rowlyk, 2008) affect achievement in sight-reading. Finally, regular practice of improvisation leads to greater improvisation achievement (Heil, 2005; McPherson, 1993).

Although the research on improvisation suggests general trends of improvisation development among young children and clarifies the factors that predict improvisation achievement among jazz musicians, no study has attempted to examine various levels of achievement for developmental tendencies among jazz improvisers. An important idea to consider is whether jazz improvisers develop their abilities in a sequential fashion or in a way that can be described by a developmental continuum. If so, what are the specific characteristics and milestones that represent a given level of development? What prompts movement from one level to the next? To address these questions, it is important to examine the assumptions of developmental theory.

Developmental Theory

A developmental theory is useful for organizing and giving meaning to facts and guiding future research (Miller, 1989). Developmental theories describe qualitative and/or quantitative changes over time, which include changes within one or more areas of behavior, changes in the relationships among many areas of behavior, and the general course of development. In other words, developmental theories describe stages of a phenomenon, changes among characteristics that define a stage, and the catalytic process or transitions between stages.

Yet, psychologist David Hargreaves (1996) asks, "Does development proceed by means of the gradual accumulation of organized skills and knowledge in a

smooth, continuous fashion with age, or is it *discontinuous* [his emphasis] proceeding in a series of discontinuous steps that are not necessarily accumulative?" (pp. 151-152). A review of the literature (see Chapter II) suggests that jazz improvisation achievement is analogous to the gradual accumulation of skills.

Koopman (1995) points out that development occurs in a specific domain (i.e., science, morality, religion) and may consist of various developmental dimensions. In this case, music is the domain and improvisation is the dimension. "The concept of dimension helps to clarify why it is often difficult to relate various research results in the field of musical development to one another: they deal with different developmental dimensions" (Koopman, 1995, p. 51). An example of this would be the developmental differences between improvising and non-improvising musicians. Even though the two groups are distinguishable by their improvisation achievement, a difference in dimension, both may be highly competent in musical performance and therefore highly developed within the musical domain.

In addition, Koopman (1995) introduces the ideas of "horizontal reconstruction", "vertical reconstruction", "logic", and "dynamics" (p. 51) within developmental theory. Horizontal reconstruction refers to the definition of a domain and its dimensions, while vertical reconstruction focuses on the developmental stages within a dimension. Logic involves the reconstruction of sequential stages of development focusing on specific characteristics that combine together in a sequence over time. Dynamics describe the process of development and the underlying principles that explain these processes. To fully investigate the development of jazz improvisation achievement, this study focuses on vertical

reconstruction, logic, and dynamics to provide a detailed explanation of development in this particular dimension.

Runfola and Swanwick (2002) suggest theories of musical development meet the following criteria: (a) have musical validity, (b) have relevance across different musical activities, (c) show maturation and cultural setting, (d) show qualitative, sequential and hierarchical changes, (e) have widespread cultural application, and (f) be supported by systemically gathered data (p. 376). Because this study focuses on jazz improvisational development, a dimension of the music domain and a culturally specific practice, any emergent theory or model developed from data analysis will likely only serve to inform this particular dimension. Transferability to other versions of the dimension (i.e., improvisation in other musical traditions) may be possible.

Developmental Continuum for Jazz Improvisation

Although a developmental continuum for jazz improvisation has yet to be systematically developed, an approach to teaching improvisation by Kratus (1996) contains a developmental explanation of the improvisation process. He based his approach on his conception of improvisation development and the Swanwick and Tillman (1986) sequence of musical development. According to his approach, there are seven levels of improvisation: (a) exploration; (b) process-orientated improvisation; (c) product-orientated improvisation; (d) fluid improvisation; (e) structural improvisation; (f) stylistic improvisation; and (g) personal improvisation. According to the model, movement from level to level depends on the musician's ability to demonstrate the characteristics outlined in succeeding levels. The next

chapter will provide a more detailed explanation of this model, including a discussion of its limitations in describing jazz improvisation development.

Bowman (1988) notes, “The pedagogy of jazz improvisation remains a rich source of problems begging investigation which promise ultimately not merely to enhance the practice of jazz education, but music education in general...” (p. 71). He asks, “Of what improvisational tasks are students capable at various developmental levels? Do there appear to be critical periods for the development of identifiable skills or dispositions associated with jazz improvising? How might taxonomic analysis of improvisational skills or the development of an improvisational taxonomy help illuminate these [questions]?” (pp. 72-73). Examining improvisers at various levels of achievement and exploring the creation of a developmental continuum for improvisation will likely illuminate pathways towards answering some of these questions.

Statement of the Problem

Despite the growth in jazz improvisation pedagogy, materials, and research over the past several decades, a systematic study focused on the developmental aspects of learning jazz improvisation has not been conducted. Studies have demonstrated that certain factors are significantly correlated with improvisation achievement, namely self-assessment, jazz theory knowledge, technical ability, aural imitation, and jazz experience (Ciorba, 2009; Madura, 1996; May, 2003; McPherson, 1993). Other studies have demonstrated that improvisation at an expert level involves sketch planning, evaluative monitoring, a rich knowledge base, harmonic and melodic directive influences, and excellent recall/memory skills (Berkowitz,

2009; Berliner, 1994; Norgaard, 2011). However, the examination of these factors at various levels of achievement (e.g., novice to advanced) through the lens of developmental theory has yet to be conducted. In addition, there is a lack of research explaining what prompts movement towards more advanced levels of achievement. Investigating these lines of inquiry will only serve to better our understanding of a seemingly mysterious process of music creation and performance. And the creation of an explanatory model of improvisation development, in turn, could serve as a useful tool for music educators and musicians alike, providing the conceptual basis for creating appropriate instructional sequences and methods for developing improvisational skills.

Purpose

The purpose of this study to examine the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement.

Research Questions

1. What are the jazz improvisation achievement levels of the participants?
2. What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement? Subquestions include:
 - a. What is the relationship between instrument facility (motor skills) and improvisation achievement level?

- b. What is the relationship between improvisation achievement level and the following background variables: (a) Age, (b) level of education, (c) improvisation experience (number of years studied), (d) jazz experience, (e) self-assessment of ability, (f) singing, (g) playing secondary instruments, (h) improvisation on secondary instruments, (i) vocal improvisation, (j) practicing improvisation, (k) perceived confidence while improvising, and (l) listening habits?
3. What developmental tendencies are evident in the analysis of the relationships among the variables and jazz improvisation achievement?
 - a. What are the characteristics of improvisation achievement that determine different levels from novice to expert?
 - b. What are the changes that occur from one level of improvisation achievement to the next?
 - c. What are the perceived challenges of learning improvisation at various levels of achievement?
 - d. What strategies do participants use for learning improvisation at different levels of achievement?

Limitations

1. The population sample drew upon a specific age range (e.g., 14-23 years of age) and achievement level (e.g., novice to advanced) of jazz improvisers enrolled in high school and collegiate music programs.

2. Only the factors of aural imitation ability, jazz theory knowledge, personal background variables, and improvisation performance achievement will be examined. These were selected due their salience in past research.
3. Neither ethnicity/culture nor gender will be variables explored in this study.
4. Evaluation of improvisation achievement will be based on a single performance of three improvisation tasks.
5. Vocal jazz improvisation will not be examined in this study.

Definitions

Aural imitation ability: The ability to repeat what is heard using one's voice or instrument.

Improvisation: The ability to extemporaneously create music by drawing upon a knowledge base of music and technical performance skills without the opportunity to edit what is performed.

Improvisation achievement: A level assigned to a participant based on his/her performance on a spontaneously created task (e.g., Blues improvisation).

Knowledge base: Everything that a person consciously thinks of and is able to do, in both a declarative (i.e., facts, ideas) and procedural (i.e., how to perform a task) fashion.

CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter I will review the existing literature on improvisation. The chapter is divided into the following subsections: (a) An overview of improvisation in American music education, (b) cognitive and motor processes of improvisation, (c) research of improvisation in education, and (d) a model of improvisation development. The chapter concludes with a summary and overview of the remaining chapters.

The research literature on improvisation in general and jazz improvisation in particular is limited when compared to other bodies of literature within music education. This can likely be attributed to the marginalization of improvisation in music education (Azzara, 2002; Sarath, 2002) due to curricular focus on note-reading skills, instrument/voice technique, and other areas serving the types of music classes (i.e., band, choir, orchestra, and general music) offered in schools. However, since the establishment of improvisation as a National Standard (1994), there appears to be increased interest in understanding its pedagogy and practice.

An Overview of Improvisation in American Music Education

Much of music education during the 19th century through the first half of the 20th century in the United States focused almost exclusively on cultivating music performance abilities, reading of notation, and appreciation through listening (Mark & Gary, 2007). Other forms of musical creativity (i.e., composition, improvisation, and musical analysis) are rarely mentioned in music education curricula of this time. And since jazz did not become a part of school music programs until the 1960's (Mark, 1975), improvisation was a skill seldom mentioned in K-12 education. Yet, as the music education profession began to re-examine the curriculum starting in the 1960s, more attention was paid to promoting these domains of music making.

Seminars and symposia

Interest in developing musicality through creative music activities began gaining momentum following the Yale Seminar on Music Education in 1963 (Campbell, 1991; Moon, 2006). This meeting resulted in twenty-five research proposals, one of which was the Manhattanville Music Curriculum Project (MMCP), created by Ronald B. Thomas (Moon, 2006), which included composition and improvisation as core curriculum components. A few years later, the Tanglewood Symposium (1967) and the Goal and Objects Project (GO)(1969) organized by the Music Educators National Conference (MENC) inspired the formation of two MENC committees. One committee examined how MENC could restructure its mission to influence curricular changes, and the other to monitor music instruction in the schools. The latter committee's findings led to an important document, *The School Music Program: Description and Standards* (1974, revised 1986).

In this document, the authors outlined a series of outcomes for music education that were precursors to the National Standards (1994). Improvisation was one practice that was promoted as an important outcome: “The elementary and secondary music program should be designed to produce individuals who: (1) Are able to make music, alone and with others; (2) are able to improvise and create music...” (George, Hoffer, Lehman, & Taylor, 1986, p. 13). In grades K-9, improvisation figured prominently in the benchmarks labeled “creating”. The expectations followed a progression from improvising songs spontaneously in the early grades to purposeful improvisation of songs and accompaniments in later grades. It should be noted that in the high school benchmarks, improvisation only appears in musicianship courses known as theory and composition. Expectations were not established for ensemble classes, particularly jazz classes.

When the National Standards for Arts Education were published in 1994, improvisation became one of nine competencies in music education. Rather than specifying what students should be able to do by each grade level, the authors wrote standards for students in elementary, middle, and high school or K-4, 5-8, and 9-12. The overarching idea stated in the Standards is for students to be able to improvise melodies, variations, and accompaniments. Differences in how this may be accomplished are clarified by each grade grouping.

A few important points should be noted. First, the expectations for learning and teaching improvisation imply a developmental progression. What sort of developmental scheme and/or understanding, if any, can be used to support the development of improvisation achievement? Next, improvisation is now deemed an

important part of a child's music education. Over the course of the last fifty years, improvisation went from a seldom-mentioned practice in music education to one of nine standard competencies. However, it remains marginalized in K-12 music education (Azzara, 2002; Sarath, 2002) and teacher preparation programs (Wollenzien, 1999), resulting in the lack of a common definition, knowledge base, and pedagogy (Azzara, 1993). As Conway (2008) notes, "The standard of improvisation is probably one of the most controversial content areas identified in the standards. Teachers in the profession hold a variety of beliefs and ideas regarding what represents improvisation..." (p. 36). Therefore, the need exists for further study of improvisation in order to develop a more common understanding of it as a practice, particularly as it relates to student musical development and pedagogy.

In order to study improvisation developmentally, it is important to review the literature examining the psychological processes involved. The next section describes current theories of the processes, skills, and knowledge that musicians use when they improvise.

Cognitive and Motor Processes of Improvisation

In recent years, there has been growing interest in the study of the cognitive and motor processes utilized in musical improvisation (Berkowitz, 2009; Biasutti & Frezza, 2009; Johnson-Laird, 2002; Kenny & Gellrich, 2002; Norgaard, 2011; Solis & Nettl, 2009). A highly complex, multi-dimensional process, musical improvisation is commonly accepted as the extemporaneous creation and performance of music.

Describing improvisation in psychological terms, Pressing (1984) states, “Improvisation may be viewed as a special kind of aesthetically constrained motor performance that maintains a commitment to high levels of real-time decision-making. Sophisticated perceptual, intellectual and motor skills are required for success” (p. 353). To understand this in more detail, this section will be divided into five general areas: (a) Overview of the improvisation process; (b) constraints and knowledge; (c) cognitive attributes in improvisation; (d) flow, and (e) improvisational expertise.

Overview of the improvisation process

Over the past few decades, psychologists, musicians, and scholars in other fields have studied improvisation and developed cognitive models to explain the process. One of the pioneers in model development was Jeff Pressing (1988), who described improvisation as a three stage information-processing model. It consists of input received by the sensory organs, processing and decision-making by the central nervous system, and motor output using muscle systems and glands. Critical to spurring this cyclical process is the reliance on feedback, allowing for error correction and adaptation. Sarath (1996) called the process a “cognitive event cycle...comprised of an actuality conception (inward stroke), the inference of possible or probable successors (outward), and the neutralization of probability relationships enabling a new actuality phase” (p. 8).

The process of improvisation begins with either sensory input from an external source (e.g., other musicians) or internal source (i.e., musician’s mind).

Pressing (1987) describes external stimuli as “open skills”, and internal stimuli as “closed skills”. The musical stimulus is then processed by the central nervous system where it triggers connections with working and long-term memory, producing a series of options or “probable successors”. Within milliseconds, the musician makes a decision of which musical idea she will perform and it is instantaneously transformed into a series of motor movements that produce a musical response. The specificity of the response effectively neutralizes the other musical options/ideas in that moment. As the statement is performed, the musician hears and feels the musical line produced and instantaneously evaluates it, leading to a repeat of the cycle. The music that emerges from the next cycle might be a repeat of the previous one, or more likely, a variation or totally new musical statement. The ability to build successively on one’s improvised musical statements requires a feedback process.

Aural, visual, proprioceptive (i.e., stimuli produced and perceived within an organism) and touch feedback is a complex aspect of the improvisational process, yet essential for controlled improvisation (Pressing, 1988). Along with the various forms of feedback, auditory monitoring and focus vacillates between what is being produced and what is coming next (i.e., attention to internal hearing). Additionally, the kinesthetic mode takes over the monitoring of repetitive or sequenced passages for instrumentalists so that attention can be devoted to macrostructural and metacognitive processes (Berkowitz, 2009; Pressing, 1988).

In their study of the cognitive processes involved and the necessary skills required for improvisation, Biasutti & Frezza (2009) found that participants (N =

76) valued the anticipation of musical events during improvisation more than the other four factors of emotive communication, flow, feedback, and use of repertoire. Significant correlations were found between anticipation and flow, and between repertoire and emotive communication and feedback. These findings support the information-processing model promoted by Pressing (1988), the role of anticipation described by Gellrich (Kenny & Gellrich, 2002), while adding the role of the flow state (Csikszentmihalyi, 1990) and emotion in motivating musicians to improvise. These latter aspects will be discussed later in the chapter.

Thus far, the aforementioned literature has provided a general description of what happens cognitively during improvisation. Yet, how is this possible? Besides having the biological components necessary to receive, process, and produce auditory stimuli, what does a musician need in order to improvise? What enables a musician to participate in this complex, multidimensional art form? And how does one develop levels of expertise? The following sections provide some answers to these questions, discussing the requisite capacities improvisers possess making improvisation possible.

Constraints and Knowledge

Internal and external constraints. Musical improvisation involves both internal and external constraints (Kenny & Gellrich, 2002). Internal constraints involve memory, motor skills, and a musician's knowledge base, while external constraints refer to socio-cultural influences, such as musical style and expectations for its performance. Stylistic constraints provide a common ground for listeners and performers to understand what is being produced (Berkowitz, 2009). If a musician

successfully adheres to the stylistic characteristics of a certain type of music when improvising (e.g., articulation, rhythmic feel), she will be effective in communicating in that style.

There is a wide variety of improvised music that ranges from little or no stylistic constraints (e.g., free improvisation) to highly specific stylistic constraints (e.g., Bebop). Although free improvisation may lack stylistic constraints, the musician's memory, motor skills and knowledge base still play an important role in how the musician creates and shapes her improvisation.

Time, however, is a constant constraint in improvisation. Sarath (1994) notes, "The improviser experiences time in an inner-directed, or 'vertical' manner, where the present is heightened and the past and future are perceptually subordinated" (p. 1). As a result, improvisation does not allow the reworking of musical ideas performed within a specific moment. Instead, the artist is compelled to play what she hears internally as best she can. If what she plays is unsatisfactory or is deemed a "mistake", her only recourse is return to the idea in a subsequent phrase and make it a part of what she intended. "The result is improvised material that appears perfectly coherent, even though it [was] derived from an unexpected event" (Norgaard, 2011, p. 118). As such, mistakes can be seen as catalysts for creativity (Kenny & Gellrich, 2002). "In fact, what audiences love is for [improvisers to make mistakes]. Then they get to see how [musicians] manage to pick [themselves] up and put the world back together again" (Nachmanovitch, 1990, p. 22). In sum, constraints play a varied, yet important role in improvisation.

Knowledge. In addition to constraints, the ability to improvise is dependent

on the improviser's "hardware" and "software" (Kenny & Gellrich, 2002). In cognitive psychology, this is known as declarative knowledge and procedural knowledge (Berkowitz, 2009; Sternberg, 2009). Declarative knowledge refers to the knowledge musicians possess that can be recalled and stated. For example, verbal (conscious) acknowledgment of a song's structure, harmonic progression, and rhythmic style are examples of declarative knowledge. Procedural knowledge, on the other hand, is knowledge of how to do something without conscious attention to doing it. This is evident in how a musician goes about improvising, her use of muscle memory, the feel and flow of performing, and other subconscious processes. Music education philosopher David Elliott (1995) emphasizes procedural knowledge as the essence of musicianship.

Both forms of knowledge form a *knowledge base* (the sum of a musician's experience), which is stored in long-term memory. The knowledge base consists of "musical materials and excerpts, repertoire, sub skills, perceptual strategies, problem-solving routines, hierarchical memory structures and schemas, [and] generalized motor programmes" (Pressing, 1998, p. 53). To improvise in a particular style, musicians draw upon their knowledge base within which contains symbolic ideas known as *referents*. Pressing (1984) clarifies, "The referent is an underlying formal scheme or guiding image specific to a given piece, used by the improviser to facilitate the generation and editing of improvised behaviour on an intermediate time scale" (p. 346). It can be anything from an image, poem, musical theme, series of chord progressions, etc. For a jazz musician improvising on "I Got Rhythm", the referent would be the form of the song, known as "rhythm changes". A

referent can also denote a temporal dimension (e.g., in-time or out-of-time referents). As the improviser works with a given referent, motives or “seeds” emerge. These seeds are then developed through repetition, juxtaposition and variation. Generating seeds is an associative process “combining previously learned gestures, movement patterns or concepts in a novel relationship or context” (Pressing, 1984, p. 351).

Developing an improvised solo. In his monograph on jazz improvisation, Berliner (1994) illustrates this process through a quote by jazz trumpeter Lonnie Hillyer, who said his objective when improvising is to “expand on” musical patterns (seeds), “trying to get the notes to grow into something, shaping them into different ideas” (p. 192). As these ideas emerge, they may reflect previously learned material, a variation of known material, or surprise the artist as new material (Berkowitz, 2009; Norgaard, 2011). The development of musical ideas and addition of new ideas is done according to the aforementioned feedback loop, a mental evaluation process (Pressing, 1984). This allows improvisers to create solos that have a sense of organic flow from one idea to the next. They transpose, vary, recombine, and develop new motives in an artful way (Berkowitz, 2009), creating the ebb and flow of tension and release, manipulating the listener’s expectations of referents (Kenny & Gellrich, 2002). For example, if a jazz musician is improvising over “I Got Rhythm”, and the referent is the form of the song, inserting alternate harmonies or extending a given section would create tension and surprise the listener. Berliner explains, “Through diverse practices of repetition and variation of discrete elements from phrase to phrase, soloists convey a sense of both continuity and closure in their

development of particular musical ideas before going on to others” (p. 196).

The ability to fluidly move from one musical idea to the next is dependent on the depth and breadth of one’s knowledge base, developed through practice and memorization. In his interviews with the contemporary pianist and scholar, Robert Levin, a specialist in improvised Western art music from the common practice period, Berkowitz (2009) learned that Levin’s success was partly predicated upon committing substantial repertoire to long-term memory. Through formal study of piano repertoire and harmony with Nadia Boulanger, Levin internalized the style and characteristics of classical piano music. When he began improvising, he had a wealth of memorized repertoire and the technical facility to play in any key, which aided him in being able to play whatever he heard in his mind.

This is similar to how jazz musicians learn to improvise. They learn the melodies and harmonies to songs, as well as “riffs” and entire solos, prompting the internalization of the jazz vernacular. They rely on what they know, especially “riffs” and solos in the early stages of development, until they are capable of linking ideas together intuitively and generating new, novel musical statements. As Berkowitz (2009) notes, “Formulas are learned not as fixed phenomena, but as flexible frameworks for future improvisations” (p. 3). In his study of expert jazz musicians, Norgaard (2011) confirms Berkowitz’s statement:

Several participants mentioned using melodic figures that were unique versions of learned models [referents], accessing a learned melodic figure from long-term memory and adapting it to fit the current context....The model may have all the information needed to perform an actual melodic

figure, but the context requires the improviser to modify the version stored in memory. (pp. 118-119).

The improvising musician learns material in a declarative fashion and then rehearses it to the point of making it a procedural (automatic) process (Berkowitz, 2009). By becoming a part of the sub-conscious, the musician is able to focus attention on developing variation and originality in her improvisations. This leads to what Kenny and Gellrich (2002) describe as transcending the knowledge base:

For improvisation to remain vital and truly spontaneous, it is important not only that the knowledge base is constantly updated and sophisticated but also that improvisers learn to transcend it. Only then are improvisers able to unconsciously avoid predictable responses and react spontaneously to less predictable variables such as other musicians' knowledge bases and audience variables. (p. 130)

Although internal and external constraints still exist in this context, they seemingly fall away as expert improvisers create novel music performances that play with audience expectations. For this to be possible, great improvisers rely on their memory capacity, and are selective in their focus of conscious attention. The following section will discuss these variables in the improvisation process, while delving deeper into the feedback mechanism (evaluative monitoring) that governs musical decision-making.

Cognitive Attributes in Improvisation

Attention. The role that attention and memory play in improvisation is fundamental to its existence. Sternberg (2009) explains, "Attention is the means by

which we actively process a limited amount of information from the enormous amount of information available through our senses, our stored memories, and our other cognitive processes” (p. 124). The benefits of attention include the ability to monitor the environment, to link past memories with present sensations, and assistance with the planning of future actions (Sternberg, 2009). With improvisation, the musician is monitoring both internal and external stimuli, drawing upon her knowledge base and anticipating where her solo will go to next.

One of the greatest challenges improvisers face is focusing attention on both the technical/motor aspects of playing as well as the musical aspects. Because there are limits to one’s capacity for attention, musicians tend to focus on one aspect at a time (Kenny & Gellrich, 2002). Through deliberate, systematic practice of scales, chord progressions, and various other exercises, improvisers develop technical fluency by committing motor actions to long-term memory. Pressing (1988) suggests improvisation achievement is linked to skill development, involving “efficiency, fluency, flexibility, capacity for error correction...expressiveness...inventiveness and achievement of coherence” (p. 27). As technical skills improve, the musician’s attention is directed toward higher-level thinking processes (Berkowitz, 2009), such as expressiveness, novelty, and coherence. To promote development of these characteristics, there is a need for increased memory (Pressing, 1988).

Working Memory. The model of “working memory”, developed by Baddeley and Hitch (1974) is helpful in understanding how the improviser is able to manage the complexity of mental tasks. In this model, the musician receives input from a

stimulus. The central executive, the control center of working memory, focuses the musician's conscious attention on the stimulus, and initiates the visuo-spatial sketchpad and the phonological loop. The visuo-spatial sketchpad is responsible for encoding and processing information that is visual or spatial, while the phonological loop does the same for sound, particularly speech (Sternberg, 2009). Through encoding and processing, the central executive relates the stimulus to previously learned material stored in long-term memory. This older material is brought into working memory until attention is focused elsewhere. As Sternberg explains, "Working memory holds only the most recently activated, or conscious, portion of long-term memory, and it moves these activated elements into and out of brief, temporary memory storage" (p. 192).

The understanding of the working memory model in conjunction with the information-processing model offered by Pressing (1988) provides a more comprehensive view of the improvisational process. The efficiency, fluency, and flexibility improvisers have in responding to new stimuli and ability to recall information from their knowledge base differentiates the expert from the novice. "Experienced improvisers are able to make sophisticated hyperconnections between prelearned material" (Kenny & Gellrich, 2002, p. 126). Such fluency enables improvisers to manage and transcend internal and external constraints.

Technical Fluency. As mentioned previously, technical fluency on one's instrument is an important part of the improvisational process. The physical capability to realize what is heard in the mind is the ideal goal for most, if not all improvisers. Becoming intimately familiar with one's instrument requires

substantial practice in a declarative fashion and rehearsing it to the point of making it a procedural or automatic process. “When skill hides itself in the unconscious, it reveals the unconscious. Technique is the vehicle for surfacing normally unconscious material from the dream world and the myth world to where they become visible, nameable, singable” (Nachmanovitch, 1990, p. 74).

There are many stories like Robert Levin’s, in which musicians have spent countless hours committing music to memory and then transposing it. The range of skills from the tactile sensation of playing on instrument keys to the image of the underlying chord structure and the sound of the musical passages are recorded in long-term memory for recall on a moment’s notice. Automaticity of motor skills allows conscious attention to be focused on higher order thinking processes. This suggests that improvisation is a multi-dimensional process involving the “conscious process of higher-level musical flow and more subconscious semi-automatized action on the micro level” (Berkowitz, 2009, p. 21).

Evaluative Monitoring. Throughout the improvisation process, the musician is constantly monitoring her performance from multiple perspectives. Pressing (1988) notes that auditory monitoring and focus gravitates from what is being produced to focus on what is coming next (i.e., internal hearing). Another mode of monitoring, the kinesthetic mode, takes over the monitoring of repetitive or sequenced passages. This describes a change from “controlled-processing” to “automatic-processing” (p. 139). Norgaard (2011) described this as “evaluative monitoring” (p. 117) where improvisers monitored and evaluated their own playing as they performed, using feedback to inform future decision-making. Berliner

(1994) characterized it as the “third ear” (p. 218) and Berkowitz (2009) labeled it the “creator-witness” phenomenon, the interaction between conscious and sub-conscious processes. He explains:

The creator-witness phenomenon could result from [the] automaticity of access to the elements of the knowledge base and the pathways that connect them. The improviser as “creator” may begin with an idea, but as soon as the idea passes through the hands, the fingers may lead spontaneously and subconsciously to another element of the knowledge base. This subconscious transition to new material may seem to be merely “witnessed” by the performer, who responds to where s/he then arrives, steering the “bobsled” again (to use Levin’s term) as “creator”. Thus, a constantly evolving dialogue emerges between the initiation of the musical flow and the response to it, a seemingly near-universal characterization of the experience of improvisation across cultures. (p. 178)

From a developmental standpoint, the creator-witness phenomenon seems to be greatest among expert improvisers. This is because they are capable of rapid cognition on multiple levels, allowing for micro-processes (e.g., selection and performance of individual notes) to operate within the realm of the sub-conscious and macro-processes (e.g., architectural shape of the solo) to be a central focus of conscious attention. Novice improvisers, on the other hand, lack the hyperconnectivity of experts. As Kenny and Gellrich (2002) state, “Novice improvisers...tend to access materials from the knowledge base in a diachronic and literal fashion by repeating prelearned motives parrot fashion or out of context...”

(p. 126). By continually building the knowledge base and practicing improvisation, novice improvisers will learn to rely more on sub-conscious processes and intuition to guide their extemporaneous music creation.

The role that attention, memory, technical fluency and evaluative monitoring play in improvisation is significant for being able to produce comprehensible musical ideas within a variety of constraints, most notable of which is time. Yet, they also play an important role in helping improvisers reach a state of “flow” as they improvise (Csikszentmihalyi & Rich, 1997). In the next section, I discuss “flow” as a stimulating and motivating experience of improvisation, while examining the role emotions play in the art form as well.

Flow. Csikszentmihalyi and Rich (1997) have suggested that musical improvisation is an ideal activity for a peak experience or flow to occur. When experiencing flow, the improviser has focused all of her attention on the task at hand, matching her skills (i.e., technical fluency, knowledge base) to the challenge of solving musical problems in the moment. The optimal state she reaches is one in which she experiences the “order of consciousness” (Csikszentmihalyi, 1990, p. 6), whereby she harnesses her psychic energy towards managing a variety of complex tasks. As she negotiates melodic and harmonic passages, paying attention to various tension and release points, her auditory and kinesthetic feedback tell her that she is successfully creating music, inspiring continued concentration and immersion in the moment. Overcoming musical challenges creates a feeling of success and a desire for continuation. Csikszentmihalyi (1990) states, “Only direct control of experience, the ability to derive moment-by-moment enjoyment from everything we do, can [we]

overcome the obstacles of fulfillment” (p. 8).

Using the full array of cognitive resources available, the improviser synchronizes her thought process with her technique in creating the flow experience. “Memory and intention (which postulate past and future) and intuition (which indicates the eternal present) are fused” (Nachmanovitch, 1990, p. 18). Berliner (1994) supports the concept of flow by stating, “Under the soloist’s extraordinary powers of concentration, the singing and visualizing aspects of the mind attain a perfect unity of conception with the body. The artist becomes intensely focused on [musical ideas] and...they are articulated as instantly as conceived” (p. 217). He describes this as “the improviser’s world of consciousness” (p. 216).

In their study of 76 improvising musicians, Biasutti and Frezza (2009) found that flow was a common experience among participants. It allowed them to experience a feeling of going beyond their cognitive limitations and performing in a spontaneous and relaxed way. This may be an important indication of an improviser’s expertise. Kenny and Gellrich (2002) explain:

Performance that incorporates flow states and risk taking may in fact hold the key to achieving optimal levels of musical communication, providing a clue as to why some musicians are able to access their knowledge bases more fluidly and creatively than other similarly skilled but less inspired improvisers. (p. 120)

In addition, flow experience creates complexity in the person in terms of differentiation and integration (Csikszentmihalyi, 1990). Differentiation for the

improviser is allowing the inner voice to emerge (transcending beyond conscious constraints and limitations). At the same time, musicians become finely attuned to the socio-cultural dynamic of making music together, which is a form of integration. It is empowering to accomplish performing a musical work with others who have all invested their psychic energy in the project. In sum, every flow activity provides a sense of discovery, pushes a person to a higher level of performance, and leads to previously unknown states of consciousness.

Improvisational Expertise. As I have discussed in this section, the development of improvisational expertise depends on a musician's knowledge base, memory, technical fluency, and the ability to work within a variety of constraints. Sternberg (2009) defines expertise as "superior skills or achievement reflecting a well-developed and well-organized knowledge base" (p. 459). As suggested earlier, expert improvisers have a deep reservoir of declarative and procedural knowledge on which rely for their fluid abilities to create music extemporaneously (Berkowitz, 2009; Pressing, 1988).

In order to clarify this further, it is necessary to examine the specific characteristics of expertise. They include: (a) large, rich schemas of declarative knowledge in the domain; (b) well-organized and connected clusters of knowledge in schemas; (c) spending more time developing problems than solving them; (d) developing sophisticated representation of problems based on structural similarities; (e) schemas consist of large amounts of procedural knowledge about domain; (f) automatization of sequences involved in problem-solving; (g) are efficient in their approach to problem-solving; (h) carefully monitor own problem-

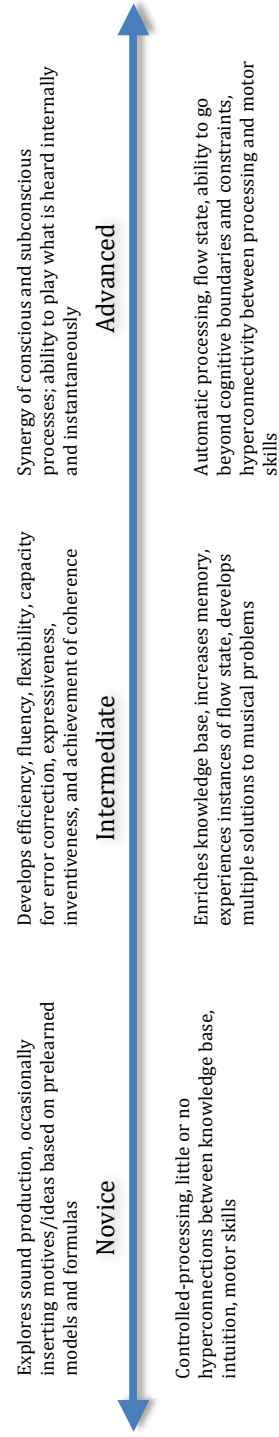
solving strategies; (i) demonstrate high accuracy in reaching appropriate solutions; and (j) are flexible in working with new information that contradicts the original representation of the problem (Sternberg, 2009, p. 465). It is important to note that these are generalizations and that not all experts will necessarily exhibit each of these characteristics to the same extent.

These characteristics are congruent with the abilities of expert improvisers. Their ability to conjure up a variety of solutions to a given musical problem (e.g., a chord progression) on a moment's notice and perform it without hesitation demonstrates their rich knowledge base, automatization of motor skills, and ability to adapt knowledge to fit different contexts. It also portrays the ability to evaluate what is occurring during the process of improvisation, ability to accurately and convincingly perform solutions to musical problems, and adapt instantaneously to a change in context (e.g., a new chord progression in place of the old one). Expert improvisers are able to recognize patterns in harmonic design, form, rhythmic feel, and other characteristics between pieces of music, enabling them to quickly and efficiently understand how to approach improvising in a particular context. When skill level meets the challenge of improvising in a given context, the performer enters a flow state, or heightened consciousness, which is a synergy between conscious and sub-conscious cognitive processes.

In Table 2.1 below, I arrange the characteristics of novice and expert improvisers on a continuum. Although this is a two-dimensional representation of the multidimensional process of improvisation, it illustrates the cognitive attributes common to these two ability levels, as suggested by the researchers above.

Table 2.1

Developmental Continuum of Improvisation Achievement



Summary

The purpose of this section was to examine the literature regarding psychological (cognitive) and psychomotor processes involved in improvising. I began with an overview of the entire process, drawing upon the information-process model put forth by Pressing (1988) as well as Sarath's (1996) cognitive event cycle. I then examined the role constraints and knowledge play in improvisation, followed by requisite cognitive attributes including attention, memory, technical fluency, and evaluative monitoring. Next, flow theory was considered in how many musicians experience improvisation. Then, the role of expertise was addressed. Finally, I summarized the main points of the section in a diagram, suggesting a developmental continuum for jazz improvisation. This two-dimensional model serves as a basis for creating a larger, more detailed model for improvisation development.

Drawing on the aforementioned models reviewed in his chapter on improvisation, Azzara (2002) states, "These models for understanding the improvisation process provide researchers with several points of departure for continued investigations. Many of the conclusions here need to be substantiated by evidence in research and practice" (p. 175). Developing a scheme for jazz improvisation achievement is dependent upon an understanding of the mental processes that occur when improvising. Although it is challenging to observe these mental processes as they occur internally, researchers are able to speak with improvisers and to examine their resultant products to verify their existence. Determining the level of achievement will then be possible by examining to what

extent these processes have developed in a given individual. The next section of this chapter will review selected studies in music education that focus on the learning and practice of improvisation.

Research on Improvisation in Music Education

Although research on improvisation in music education was conducted prior to the adoption of the National Standards for Arts Education (1994) (Azzara, 1993; Burnsed, 1978; Flohr, 1979; McPherson, 1993; Moorhead & Pond, 1978), there has been growth in the literature since establishing it as one of the core competencies of music education (Beegle, 2006; Brophy, 2005; Ciorba, 2009; Guilbault, 2009; Heil, 2005; Kiehn, 2003; Koutsoupidou & Hargreaves, 2009; Madura, 1996; Mang, 2005; May, 2003; McPherson, 2005; Pignato, 2010; Rowlyk, 2008; Watson, 2010). Topics that have received attention among researchers include the development of improvisation achievement among young children (Beegle, 2006; Brophy, 2005; Guilbault, 2009; Kiehn, 2003; Koutsoupidou & Hargreaves, 2009; Mang, 2005), factors that predict jazz improvisation achievement (Ciorba, 2009; Madura, 1996; May, 2003), and the type of instruction and its effect on improvisation achievement (Heil, 2005; Rowlyk, 2008; Watson, 2010).

The literature reviewed here focuses on studies primarily conducted in elementary, secondary, and tertiary education settings. Some studies focus on jazz improvisation, while the vast majority focuses on improvisation without reference to style. This section is divided into the following subtopics: (a) Developmental tendencies in young children's improvisations, (b) improvisation's effect on

performance achievement, (c) cognitive processes of improvisation, and (d) factors influencing improvisation achievement.

Developmental tendencies in young children's improvisations

Children demonstrate developmental tendencies as improvisers as they grow older. These tendencies include movement towards purposive, controlled improvisations containing rhythmic and melodic patterns as well as structural sophistication. In general, improvisation achievement seems to grow more complex over time, particularly when it is a regular part of the child's music making activities.

One of the seminal studies of children's creativity was Moorhead and Pond's (1978) research conducted at the Pillsbury Foundation School in Santa Barbara, California in the 1930's and 1940's. In this study, an environment was created to stimulate the children's imagination and allow music to naturally assume a part of their daily activities. No adult intervention or leading of musical activities was imposed. Children ranging from ages 2 through 8 were participants in the study. Moorhead and Pond discovered that children show developmental characteristics in their singing and instrumental improvisations. "Free use of varied instruments led to growth in understanding timbre, pitch, vibration, rhythm, tonal relationship and melody. Experiment gradually became more purposive and controlled, producing music with simple pattern and form" (p. 117). In addition, they noted "We observe[d] throughout the entire period of the child's growth a close relationship between his experimentation with sound and the development of his physical,

intellectual and imaginative faculties” (p. 40). Such findings indicate developmental tendencies of children as improvisers.

Flohr (1979) conducted a study to characterize and describe the musical behavior of children ages 4, 6, and 8 while involved in improvisatory tasks. The study involved twelve children (six boys and six girls) performing on an Orff xylophone in three phases: free exploration, guided improvisation, and exploratory improvisation. Results indicate young children are able to improvise patterns in response to melodic, rhythmic stimuli, and verbal stimuli. The 6 and 8-year-old child maintains interest when exploring sound possibilities on the same instrument and is capable of improvising larger formal structures. In summary, the findings suggest that 4, 6, and 8-year-old children are able to freely improvise music that is unique and their improvisations change as they grow older, becoming more patterned and purposeful.

Kiehn (2003) compared the music improvisational creativity of students in Grades 2, 4, and 6. Research questions included the following: (a) Are there significant grade level or gender differences for scores on a test of music improvisational creativity? (b) What relationships exist among music improvisational creativity, figural creativity, and academic achievement? (p. 280) Participants (N = 89) were elementary students randomly selected in three randomly selected schools in the Western United States. Participants were administered the Vaughan Test of Musical Creativity (TMC)(tape-recorded), measuring improvisational creativity, and the Torrance Tests of Creative Thinking (TTCT), measuring figural/artistic creativity. Results indicated that creativity scores

are higher for boys than girls; specifically, the musical fluency, originality, and composite scores were significantly higher for boys. The study suggests that there is a creativity growth stage between grades 2 and 4, and no significant change from grades 4 to 6. This may be attributed to less emphasis on improvisation in later grades. Results also suggest that there is a positive correlation between music creativity and figural creativity. No significant relationships were found between academic achievement and music creativity or figural creativity scores.

In a longitudinal study, Brophy (2005) examined the melodic improvisations of children (N = 62) ages 7 to 9, for a period of three years. Improvisations took place within the performance of a Rondo in ABACADA form, where B, C, and D sections, eight measures in length, were improvised. Improvisation performances were video-recorded while notation was taken using technology attached to the Orff instrument, linking it to a computer. A total of three improvisations per student were recorded, resulting in 558 improvisations being analyzed. Brophy summarizes his findings, stating:

Overall, this group of children improvised very different improvisations at age 7 than they did at ages 8 and 9....To the listener, their improvised melodies sounded more random, musically unorganized, and less 'on the beat' than they did when the children were older. As children aged, their melodies contained fewer repeated melodic motives, more repeated rhythmic motives, greater adherence to the pulse, and exhibited more phrase development. (p. 130)

These findings corroborate the findings by Moorhead and Pond (1978) and Flohr (1978) that children's ability to improvise becomes more purposeful and complex over time.

Improvisation's effect on performance achievement

The study of improvisation seems to positively affect general performance and improvisation achievement, such as sight-reading ability (Azzara, 1993), performers' attitudes (Burnsed, 1978) and awareness of various musical features (Azzara, 1993; Guilbault, 2009). The following studies examine this with respect to implementing an improvisation curriculum (Azzara, 1993; Burnsed, 1978; Rowlyk, 2008) or specific music learning strategies (i.e., harmonic instruction) (Guilbault, 2009).

Burnsed (1978) developed and evaluated an introductory jazz improvisation sequence as a supplementary activity within an intermediate band class. Participants (N = 235) were students in grades 7 through 9 from three intermediate band programs in Georgia. The treatment group (n = 114) participated in pentatonic scale study, call and response activities, and improvisation over a blues accompaniment for 20 minutes per day for five weeks. The control group (n = 121) received regular class instruction. Burnsed found that the proposed improvisation sequence was effective in developing improvisation skill among eighth grade and ninth grade students. It seemed to positively influence students' attitudes, although the youngest students (seventh grade) seemed to enjoy the improvisation experience more than the older students. Students in older grades performed better at improvised tasks based upon more advanced cognitive and technical ability.

Finally, it did not impact sight-reading achievement between experimental and control groups.

Azzara (1993) created and tested an improvisation curriculum designed to positively affect music achievement (reading music notation) in elementary school music students. Sixty-six fifth-grade students in two elementary schools who had played their instrument for at least one year participated in the study. They were randomly assigned to experimental and control groups and a treatment administered for a portion of one 30-minute class per week. The treatment consisted of (a) learning selected songs by ear, (b) developing a vocabulary of tonal and rhythm syllables, and (c) improvising vocally and with their instruments on tonic, dominant, and sub-dominant harmonic patterns. After 27 weeks, all students performed three researcher-designed etudes and were assessed by four college students, using a rating scale that measured tone, rhythm, and expressive performance. Results suggest improvisation study contributes to the improvement of fifth grade students' instrumental performance achievement. Through the process, students seem to develop an increased awareness of harmonic progression and a clearer understanding of the tonal, rhythmic and expressive elements of music when reading notation.

Similar to Azzara's study, Rowlyk (2008) examined the effects of improvisation instruction on non-improvisation music achievement of seventh and eighth grade instrumental students. Participants were seventh and eighth grade instrumentalists (N = 93) from a single middle school in Pennsylvania, divided into an experimental group (n = 47) and control group (n = 46). Improvisation

instruction served as the treatment, which was administered 10 minutes per day twice a week for 18 weeks. Rowlyk stated, “As a result of the data obtained in this study, it may be concluded that teachers have no reason to expect the teaching of supplemental improvisation instruction to 7th and 8th grade instrumental music students to help them be more successful at notation-related music achievement” (p. 87). These findings contradict the findings by Azzara (1993).

Guilbault (2009) examined the effects of harmonic accompaniment on the tonal improvisations of elementary students. Participants (N = 419) were elementary students in grades 1 through 6 in a Michigan school. Students were randomly divided into treatment and control groups. The treatment was the inclusion of “root melody accompaniment” (i.e., bass line accompaniment) to songs sung in class. The treatment period lasted a full academic year, after which a performance test was administered requiring students to improvise an ending to an unfamiliar song without text and without root melody accompaniment. The improvisations were recorded and evaluated by three music educators using Gordon’s Improvisation Rating Scale (1998). Results indicated that the students who received instruction with root melody accompaniment achieved significantly higher ratings than the students in the control group. The mean scores were not significantly different across grades, suggesting little developmental difference in improvisation. Although this contradicts findings in other studies (e.g., Brophy, 2005; Flohr, 1979), the task and instrument were different.

Cognitive processes of improvisation

As previously noted, as children grow older, their improvisations demonstrate an increasing knowledge base and ability to draw on referents in their knowledge base for improvisation. Those learning an instrument seem to have greater success improvising if they have developed a variety of performance strategies. Strategies improvisers may use include imitation, memorization, and motivic development.

Although not a study focused solely on improvisation, Mang (2005) collected and analyzed data on children's early songs and investigated whether children's use of learned songs may serve as the referent for own improvised songs. This longitudinal study involved observation and recordings of eight girls, ages 2 to 4 years old, selected based on personal contacts. Each child was visited at her home every 4 to 6 months over 42 months, where the researcher tape-recorded the child speaking and singing as well as brief informal conversations with the parents. Three judges with a background in music and singing analyzed the children's vocalizations. Results indicated that self-generated songs from children ages 2 to 3 seemed to come from fragments of learned songs, yet contained fewer diatonic and metrical rhythmic patterns than in learned songs. For children ages 3 to 4, self-generated songs were common, integrating narration and adaptation of a learned song. In addition, these children improvised with movements, musical instruments, and other playful activities. This group of children also began songs in one tonality and modulated one or more times throughout their singing. Mang concludes:

Observations...suggest that through using learned songs as referent, a child would vary the musical features of a familiar song to create and improvise according to their imagination. Hence, the resultant early songs exhibit a distinctive sense of ownership and rich creative instinct. (p. 17)

In essence, this can be characterized as an approach to improvisation, varying the musical features of a referent. Mang's research suggests that young children use this approach much like older, more experienced improvisers. When combined with previous studies, such as Moorhead and Pond (1978), this study provides additional insight into how children use their knowledge base to create new music.

Improvisation can also be helpful in learning an instrument. In a 3-year longitudinal study, McPherson (2005) studied children (N = 157) in third and fourth grade (ages 7-9) who were beginning to learn an instrument. Children were tested at the end of their second year to assess their abilities to (a) perform rehearsed music, (b) sight-read, (c) play from memory, (d) play by ear, and (e) improvise. McPherson was interested in clarifying the extent to which children's learning of music followed a sequence and to investigate why some struggled in comparison to others who made quick progress. He found that for improvisation, improvement was consistent from years one to two of the study, but leveled off between years two and three. He attributed this to a lack of focus on improvisation in lessons. Children who were successful in all areas possessed "more sophisticated strategies for playing their instrument" (p. 27). These musicians "knew when and how to apply their strategies, possessed the general understanding that their performance was tied to the quality of their effort, and were able to coordinate these actions to

control their own playing” (p. 27).

In a qualitative study of children’s musical improvisations, Beegle (2006) examined the processes, products, and the interactions that transpired during children’s group improvisations. The study took place in an urban, public elementary school in the Pacific Northwest and involved 46 fifth-grade children. The two classes participated in 12 improvisation lessons, which were divided into three distinct units consisting of four lessons each. The units contained prompts for improvisation, consisting of three art forms: a poem, painting, and an excerpt from a professional music composition.

Two cognitive strategies for approaching improvisation emerged from the findings: (a) the children demonstrated three strategies (imitation, memorization, and motivic development) as well as three “valued considerations” (organization, ensemble cohesion, and choice of instrumentation) in the planning and evaluating of improvisation performances; and (b) children’s musical products were influenced by and emerged from the tonal and rhythmic material they had learned over three years through Orff-Schulwerk pedagogy. This last finding further confirms the influence of learned songs (i.e., knowledge base) on improvisational achievement.

Studying the products and perceptions of expert jazz musicians, Norgaard (2011) sought to describe the cognitive processes underlying their ability to improvise. Participants included seven artist-level jazz improvisers selected by the researcher, who were asked to perform a blues in F major using a melody of their choice, followed by an improvised solo. The participants were accompanied solely by a drum track at a “medium-up tempo” (p. 113). The performances were video-

recorded and audio-recorded, the latter being converted to a MIDI file that sketched a rough transcription of each solo. Norgaard then interviewed each participant about what he was thinking during his improvisation as he listened to the audio recording and viewed the notation.

Six themes emerged from the interview data. First, the artists described sketch planning and evaluative monitoring processes. These processes involve the planning of where the solo is going while monitoring what was just played. Four strategies for improvisation were also identified: (a) memorized music or idea bank (knowledge base), (b) selection of notes based on harmonic progression, or harmonic priority, (c) selection of notes based on melodic progression, or melodic priority, and (d) recall of previously played material. These themes confirm previous theoretical descriptions of cognition during improvisation (i.e., knowledge base, use of referents, memory) and suggest a developmental continuum of improvisation achievement when considering the same processes utilized by young children.

Factors influencing jazz improvisation achievement

Improvisation achievement is linked to a variety of factors including technical proficiency on an instrument, singing, experience playing other instruments, music theory knowledge, and imitative ability. Success is also linked to regular improvisation practice, listening to recordings, ability to self-assess one's improvisational performance, and high self-efficacy towards improvisation. Variables such as psychosocial maturity, age, sex, musical aptitude and music achievement may not influence improvisation achievement.

Bash (1984) studied the relationship among musical aptitude, musical achievement, psychosocial maturity, sex, age, preliminary improvisation performance and the acquisition of improvisation performance skill. Using a sample of 60 high school students who played melodic instruments in their schools' jazz ensembles, Bash employed a randomized control group pretest-posttest design involving a treatment group receiving improvisation instruction. Using a variety of measures, such as Gordon's (1965) *Musical Aptitude Profile* (MAP), *Watkins-Farnum Performance Scale* (1954) and the researcher's own *Improvisation Performance Instrument* (IPI), Bash collected data and used a multiple regression analysis to find no statistically significant factors for determining the acquisition of improvisation performance skill.

McPherson (1993) studied the improvisation ability of high school instrumentalists. He designed the Test of Ability to Improvise (TAI), that consisted of seven items asking the subjects (N = 101) to improvise in a variety of "stylistically conceived" and "freely conceived" idioms. Results indicated that improvisational ability is not significantly correlated with performance proficiency at the beginning of instrumental study; yet, for more advanced musicians, improvisational ability is significantly correlated with performance proficiency. Singing, mental rehearsal, and the learning of other instruments may influence improvisational skill, especially piano. Improvisational practice was also significantly related to improvisational skill.

Madura (1996) explored the relationships among characteristics of vocal jazz improvisation achievement and various predictor variables. Participants (N = 101)

included college students enrolled in a vocal jazz ensemble or class. They performed two vocal jazz improvisation tasks, which were evaluated by a panel of three expert judges using a researcher-designed instrument that measured tonal, rhythmic and expressive items. In addition, participants were assessed for imitative ability, jazz theory knowledge, jazz experience, and their general creativity using a variety of instruments. Results indicated that jazz theory knowledge, imitative ability, and jazz experience are statistically significant predictors of jazz improvisation achievement.

In research examining predictors of jazz improvisation achievement among instrumentalists, May (2003) studied 63 undergraduate wind players enrolled in jazz ensemble at five Midwestern universities noted for having strong jazz programs. May designed four evaluative instruments for her study: (a) The Measure of Jazz Theory Achievement (b) the Measure of Aural Skills, (c) the 40-item Measure of Aural Imitation, (d) the Instrumental Jazz Improvisation Evaluation Measure (i.e., technical facility, melodic and rhythmic development, style, use of harmonic material, expressiveness, rhythmic/time feel, and creativity) which served as a rubric for judges to assess participants' improvisation over the F Blues and one chorus of "Satin Doll". Three variables were found to be predictors of jazz improvisation achievement: (a) self-evaluation, (b) aural imitation, and (c) improvisation class experience. May provided a theoretical model for instrumental jazz improvisation based on her research:

- (a) development of theoretical knowledge of jazz scales and chords, aural skills, and aural imitative ability, (b) acquisition of idiomatic melodic material through memorization of tunes, (c) experimentation with melodic

and rhythmic development, and (d) manipulation of expressive elements.

These should be acquired in an analogous fashion and in an atmosphere balanced between disciplined practice and creative experimentation.” (May, 2003, p. 255-256)

In one of the few studies of vocal improvisation at the high school level, Heil (2005) studied the relative effectiveness of two different approaches (technical/theoretical and melodic/imitative) to teaching vocal jazz improvisation. A stratified random sample of 14 vocal jazz choirs from 14 schools was selected from a pool of 24 high schools. Then, all students in the choirs were stratified according to gender (male or female, *sic*) and eight from each choir, were randomly selected to provide pre and post performance achievement data. Five choirs received instruction using the melodic/imitative method, four choirs received instruction treatment using the technical theoretical method, while the other five choirs served as control groups.

Results indicate both methods of instruction did significantly affect the tonal approach to improvising to rhythm changes when compared to the control group. In addition, neither jazz improvisation method had an effect on student attitude toward jazz choir, which remained high from pre to post-test attitudinal measurements. Finally, the following background variables were significantly correlated to vocal jazz improvisation achievement: (a) Self-perception of jazz improvisation skill, (b) private instrument study, (c) possession of jazz recordings, (d) self-perception of solo singing skills, (e) practice frequency, and (f) years of interest in jazz and desire for a professional career. Of these, self-perception and

number of years of private study were the strongest predictors of vocal jazz improvisation performance.

Ciorba (2009) developed a path-analytical model based on variables influencing improvisation achievement. His study combined seven variables (self-assessment, self-efficacy, motivation, jazz theory knowledge, academic achievement, sight-reading ability, and listening experience) in order to examine correlations with jazz improvisation for the model. Participants (N = 102) included high school students attending schools in Florida and Michigan and enrolled in their school's jazz ensemble. Based on scores from a performance assessment, students were placed in groups based on performance ability: (a) beginner (n = 74), (b) novice (n = 12), and (c) advanced (n = 16). The jazz improvisation achievement assessment was developed based on previous studies, including May (2003) and Madura (1996). Students were asked to complete the following: (a) a self-assessment of their performance (Jazz Improvisation Self-Assessment), (b) an assessment of their self-efficacy towards improvisation (Jazz Improvisation Self-Efficacy), (c) a motivation assessment titled Magnitude of Motivation, (d) a theory test (Jazz Theory Assessment Measure), (e) performances of sight-reading exercises (Watkins-Farnum Performance Scale), and (f) a survey of their listening experience. Results indicated that self-assessment and jazz theory knowledge are factors having a direct effect on improvisation achievement.

Discussion

A variety of themes emerge from the synthesis of the previous studies. As children grow older, their improvisation becomes more purposeful and complex,

including the use of motives, referents, and phrase structure (Brophy, 2005; Flohr, 1978; Kiehn, 2003; Mang, 2005; Moorhead & Pond, 1978). Improvisers draw upon a wide storehouse of knowledge (i.e., referents and musical skills) when improvising (Beegle, 2006; Mang, 2005; Moorhead & Pond, 1978; Norgaard, 2011). Intentional teaching strategies and curriculum for developing improvisational skill are effective (Burnsed, 1978; Heil, 2005). Examples include root melody accompaniment and emphasis on harmonic progressions (Azzara, 1993; Guilbault, 2009). The inclusion of improvisation in instrumental study enhances performance (Azzara, 1993; McPherson, 2005), positively affects development of creative thinking (Kiehn, 2003), and is meaningful (Burnsed, 1978). Singing and playing an instrument or multiple instruments positively influences improvisation achievement (Heil, 2005; McPherson, 1993) as does jazz theory knowledge, self-assessment, and aural imitation (Ciorba, 2009; May, 2003). Variables such as psychosocial maturity, age, sex, musical aptitude and music achievement may not influence improvisation achievement (Bash, 1984). Improvisation at expert levels involves sketch planning, evaluative monitoring, rich knowledge base, harmonic and melodic directive influences, and excellent recall/memory skills (Norgaard, 2011). Improvisation may (Azzara, 1993) or may not (Burnsed, 1978; Rowlyk, 2008) affect achievement in sight-reading. Regular practice of improvisation leads to greater improvisation achievement (Heil, 2005; McPherson, 1993).

Considered as a whole, this body of research on musical improvisation is relatively small in comparison to other literature bases in music education. The fact that this research is recent is surprising given the notion that improvisation has

been a fundamental part of human music making for thousands of years (Nettl, 1974). This is likely due to its limited existence in music education curricula and the growing desire among certain music educators and researchers to justify its role in developing musicianship and creativity in formal music education settings. A basic summary of the research reviewed suggests that improvisation is a “high-level teachable skill that improves with intellectual development, learning, practice, and experience” (Koutsoupidou & Hargreaves, 2009, p. 253). To aid teachers in achieving this goal, it would be helpful to have a developmental perspective of the skills, knowledge, attributes and abilities of improvisers at various achievement levels. The following section provides a description of the only model found in the literature that attempts to provide this perspective.

Developmental Explanation of Improvisation

Although a developmental model for improvisation has yet to be systematically developed, an approach to teaching improvisation by Kratus (1996) contains a developmental explanation of the improvisation process. He based his approach on his conception of improvisation development and the Swanwick & Tillman (1986) sequence of musical development. According to his approach (Table 1), there are seven levels of improvisation: (a) exploration; (b) process-orientated improvisation; (c) product-orientated improvisation; (d) fluid improvisation; (e) structural improvisation; (f) stylistic improvisation; and (g) personal improvisation. (Please see Table 1 for a brief description of stage characteristics.)

Kratus suggests improvisations at all levels share certain characteristics. These amount to a commonly accepted definition of improvisation: (a)

Improvisation is the performance of purposefully selected sounds in time; (b) the resultant sounds of performance become the musical product, and cannot be revised once performed; and (c) improvisation allows the performer to make musical decisions (e.g., pitch, dynamics, articulation, etc.) within constraints (e.g., time, style of music).

He also indicates five differences between the novice and expert improviser: (a) The expert improviser can internally hear what notes s/he will play (audiation); (b) experts strive to create a product (i.e., product-orientation), whereas novices focus more on process (i.e., process-orientation); (c) experts have total technical mastery of their instrument (i.e., automaticity); (d) experts have a rich knowledge base; (e) experts understand and utilize stylistic conventions (e.g., swing feel, jazz articulation, licks/patterns). Certainly there are other factors to consider, such as the ability to transcend constraints (i.e., play outside the harmonic progression or play with a different time feel), the interplay between intuition and one's knowledge base, memory, and other areas suggested previously by the cognitive theorists who have studied improvisation. Yet what can one say about improvisers at the intermediate level?

The Kratus developmental sequence for improvisation is a broad description of improvisation development. How would this apply to jazz improvisation development? One issue that arises concerns the age and ability level of a person when s/he begins playing in the jazz idiom. Most children who learn jazz begin playing it during their middle school years (grades 6-8, or ages 11-13) or high school years (grades 9-12, ages 14-18) and have some experience already playing

their instrument. Their musical understanding may be more sophisticated than that of a young elementary school student. Therefore, their beginning improvisation level would likely skip the first level (exploration) and begin in the second level (process-oriented improvisation), where musical patterns are evident in the improvisation. Also, their intellectual understanding of improvisation may be significantly more advanced than their performance ability. How might this be represented in the model?

What do improvisations by novice improvisers look like and sound like when compared to those at more advanced levels? What specific characteristics define a particular achievement level and how do musicians advance to the next level? Answers to such questions will provide important clues to the understanding of jazz improvisation achievement.

Table 2.2

Kratus Model of Improvisational Development (1996)

Level	Characteristics
1. Exploration	<ul style="list-style-type: none"> • Pre-improvisational activity • Does not audiate sounds • Explores timbre • Process-oriented
2. Process-oriented improvisation	<ul style="list-style-type: none"> • Rudimentary control of sounds • Focus on process • Lacks large syntactic structure
3. Product-oriented improvisation	<ul style="list-style-type: none"> • Improvisation recognized as music • Shares with others • Some syntactic structure • Conscious manipulation of sound
4. Fluid Improvisation	<ul style="list-style-type: none"> • More automatic technique • Focus on musical characteristics • Sounds technical/mechanical
5. Structural Improvisation	<ul style="list-style-type: none"> • Use of strategies - tension/release • Occasionally breaks rules of tonality • Strategies musical or non-musical • Sounds technically correct, but lacks stylistic nuances
6. Stylistic Improvisation	<ul style="list-style-type: none"> • Mastery of musical style • Demonstrates detailed understanding of stylistic elements • Ability to imitate what is heard and felt
7. Personal Improvisation	<ol style="list-style-type: none"> a. Transcends boundaries of a style b. Creates a new style c. Comfortable working within and without constraints

Summary

The purpose of this chapter was to review the literature on improvisation. It began with an overview of improvisation in American music education, where it was a practice rarely mentioned until the 1960s. Since then, it has garnered increased interest and advocacy, leading to its inclusion in the National Standards for Arts Education (1994). The next section of the chapter explored the cognitive processes of improvisation, what is occurring in the mind of the performer while improvising. Topics covered included constraints, knowledge, attention, memory, technical fluency, evaluative monitoring, flow, and expertise. The achievement level or ability of an improviser is linked to the presence and degree of fluidity among these characteristics. The third section summarizes studies examining improvisation found primarily in music education settings at the primary, secondary, and tertiary levels. Major thematic areas include developmental tendencies of young children, improvisation's effect on performance achievement, cognitive processes of improvisation, and factors influencing improvisation achievement. The last section explains a broad developmental model for improvisation suggested by John Kratus (1996) that consists of seven stages that moves from novice to expert, establishing the need for creating a model more applicable to jazz.

The emergence of research studying the cognitive processes involved in improvisation suggests there is a complex interaction between various modes of thinking to create what is made audible. That is, the interaction between what a person knows (i.e., knowledge) and technical fluency, is dependent upon attention,

memory, evaluative monitoring, and level of expertise. When these modes of thinking are efficient and in sync, the musician is able to reach and experience a higher state of flow and ultimately, create a performance that is unique. This much is clear. However, what are the thought processes of less-experienced improvisers? How are these cognitive processes operating in novice or intermediate level improvisers?

Past research on jazz improvisation has determined that aural imitation, jazz theory knowledge, self-assessment, and jazz experience (i.e., regularly studying and performing jazz) directly affects jazz improvisation achievement. Are there other factors that may contribute to this achievement, such as technical facility or improvisation experience? How does the nature of the improvisation, from a musical perspective (i.e., melody and rhythmic development), change as these factors are analyzed in improvisers of differing achievement levels? If age is a factor in children's improvisations, is it a factor in the development of jazz improvisation? Finding answers to these questions will not only fill a gap in the research literature on improvisation, but also lead to a better understanding of the overall development of jazz improvisation achievement.

The next chapter will provide a detailed description of the method used for conducting this study. A review of the study's purpose and research questions precedes a description of the population and sample and an explanation of the development of four researcher-designed instruments used for data collection. Pilot testing procedures and revisions to instruments are described followed by the procedure for executing the data collection. The chapter concludes with an

explanation of data analysis techniques and construction of a jazz improvisation achievement model.

CHAPTER III

METHODOLOGY

This chapter provides information on how the study was conducted. Details concerning the population sample, research sites, data collection, instrumentation, pilot testing of instruments, main study procedures, and data analysis are given. As mentioned previously, the purpose of this study was to examine the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement.

Research Questions

1. What are the jazz improvisation achievement levels of the participants?
2. What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement? Subquestions include:
 - a. What is the relationship between instrument facility (motor skills) and improvisation achievement level?
 - b. What is the relationship between improvisation achievement level and the following background variables: (a) Age, (b) level of education, (c) improvisation experience (number of years studied), (d) jazz experience, (e) self-assessment of ability, (f) singing, (g) playing secondary instruments, (h) improvisation on secondary instruments, (i) vocal improvisation, (j)

- practicing improvisation, (k) perceived confidence while improvising, and (l) listening habits?
3. What developmental tendencies are evident in the analysis of the relationships among the variables and jazz improvisation achievement?
- What are the characteristics of improvisation achievement that determine different levels from novice to expert?
 - What are the changes that occur from one level of improvisation achievement to the next?
 - What are the perceived challenges of learning improvisation at various levels of achievement?
 - What strategies do participants use for learning improvisation at different levels of achievement?

Participants

The participants in this study ($N = 70$) were high school and college instrumental music students who self-identified as having jazz improvisation experience. In determining the population for this study, it was important to consider the type of population most likely to be studying jazz in a music education context. Naturally, there are adult populations performing in the jazz idiom outside of the collegiate context, such as community jazz ensembles and dance bands. However, the main aims of these types of groups are community entertainment and enjoyment of performing rather than education. The aims of school jazz ensembles are inherently educational. In addition, school ensembles are more likely to provide

more variability of improvisation achievement than adult ensembles. Therefore, this study focused on participants in high school and collegiate jazz programs.

Sample

The sampling procedure for this study utilized nonprobability sampling, due to the limited numbers of musicians who improvise in the jazz idiom. Specifically, this study used *stratified purposeful sampling*. As Gall et al. (2007) state:

A stratified purposeful sample includes several cases at defined points of variation (e.g., average, above average, and below average) with respect to the phenomenon being studied....[This enables the researcher to] develop insights into the characteristics of each type, as well as insights into the variations that exist across types. (p. 182)

Use of this sampling procedure allowed for greater variation in improvisation achievement among participants, thereby creating opportunity for a more detailed analysis of their developmental characteristics and tendencies.

Jazz ensemble directors and music education professors at five high schools in Michigan and nine colleges throughout Michigan and New York were contacted via email and/or telephone about the need for participants for this study (see Appendix L). The selection of each school was based on reputation of its jazz program, its overall music education program, and in some cases, personal acquaintance with the faculty of the institution. One high school and five colleges responded to my request to participate. The other institutions did not participate due to lack of response to my initial request, challenges in scheduling time for the study, or lack of authorization from the school district.

Using their first-hand knowledge of their students' improvisation abilities, these music teachers helped recruit participants with varying degrees of improvisation achievement. Although all participants had some improvisation experience, not all were current members of their school jazz program. Such participants were college musicians with some high school jazz experience, whom the college music teachers taught in other music classes (e.g., music education methods courses). In the end, the stratified purposeful sample ($N = 70$) included 26 high school students from a high school in Michigan and 44 college students from three colleges in Michigan and two colleges in New York. For more information about the sample, please see Table 3.1.

Table 3.1

Description of Participant Population (N = 70)

Variable	Frequency	Percent
Education		
High School	26	37.1
College	44	62.9
Age		
14	4	5.7
15	13	18.6
16	6	8.6
17	2	2.9
18	9	12.9
19	5	7.1
20	8	11.4
21	12	17.1
22	10	14.3
23 or older	1	1.4
Gender		
Male	53	75.7
Female	17	24.3
Primary Instrument		
Saxophone	21	30.0
Trumpet	16	22.9
Trombone	9	12.9
Guitar	8	11.4
Piano	5	7.1
Bass	5	7.1
Vibes	3	4.3
Violin	2	2.9
Viola	1	1.4
Years of Jazz Experience*		
One	9	12.9
Two	9	12.9
Three	12	17.1
Four	8	11.4
Five	6	8.6
Six	5	7.1
Seven	7	10.0
Eight or more	12	17.1
Years of Improvisation Experience		
One	17	24.3
Two	12	17.1
Three	7	10.0
Four	14	20.0
Five	5	7.1
Six	7	10.0
Seven	5	7.1
Eight or more	3	4.3

*Two participants did not respond to this question.

Data Collection and Instrumentation

Data collection for this study was conducted using researcher-designed measures combined with audio recordings. In order to answer the research questions stated above, it was necessary to construct the following measurement instruments: (a) Participant Improvisation Experience Survey (PIES), (b) Improvisation Achievement Performance Measure (IAPM), (c) Aural Imitation Measure (AIM), and the (d) Jazz Theory Measure (JTM). An explanation of the construction and pilot-testing procedures for each instrument is given below.

The *Participant Improvisation Experience Survey* (PIES)(see Appendix A) was developed to gather demographic and improvisation performance experience data from the participants. Topics include year in school, primary and secondary instrument, sex, age, improvisation experience, frequency of improvisation practice, methods used for learning improvisation, listening experience, confidence level when improvising, and self-reported rating of improvisation ability. The PIES was published using software through Google Docs. It was pilot tested with four high school students and one university student. Participants made suggestions for improving the instrument such as rewording certain items, including additional items, and reformulating some items from categorical to continuous data. These changes were made in the instrument for the main study.

The *Improvisation Achievement Performance Measure* (IAPM)(Appendix D) is a Likert-type rating scale developed to measure expert judges' perceptions of improvisation achievement among participants. Based on previous studies incorporating a performance measurement instrument for jazz improvisation

(Burnsed & Price, 1984; Ciorba, 2006; Madura, 1996; May, 2003; Smith, 2007) and the scale development guidelines by DeVellis (2003), the instrument constructed consists of seven categories: (a) Technique, (b) rhythm/time feel, (c) harmony, (d) melodic/rhythmic development, (e) style, (f) expressivity, and (g) creativity. The use of these categories in previous studies as well as confirmation by two graduate students enrolled in Jazz Studies at a major Midwestern university supported its content validity.

Once the categories were defined, a word bank (see Appendix B) was developed through analysis of jazz books and periodicals (Aebersold, 1967; Axelrod, 1999; Berliner, 1994) describing characteristics of jazz improvisation. The words were then converted into statements for an item pool (see Appendix C), as outlined by DeVellis (2003).

Previous studies have approached evaluating improvisation performance by assigning a Likert-type rating to each of the above-mentioned categories (Ciorba, 2006; May, 2003). However, for this study, where the purpose is to examine and describe developmental tendencies of improvisers, I found it necessary to specify different aspects of a given category. For example, in previous measures “Rhythm/Time Feel” simply examined the extent to which the soloist could play with rhythmic continuity. Yet, this does not leave room for noting the soloist’s ability to demonstrate double time feel or groove with the recording. Such details will be expressed differently by each person and therefore, provide more meaningful data for constructing a developmental model for improvisation achievement.

As DeVellis (2003) notes, “If a scale fails to discriminate differences in the underlying attributes, its correlations with other measures will be restricted and its utility will be limited. One way to increase opportunities for variability is to have lots of scale items” (p. 75). Thus, the majority of the categories have more than one scale item. This also maximized the approach to measuring the construct of improvisation achievement, ensuring greater validity and reliability.

In addition to categorical ratings, the IAPM asks the evaluators to determine the overall improvisation achievement level of the performer on a six-point scale (i.e., novice to expert). This rating was fundamental for analyzing developmental tendencies of improvisation achievement by helping to establish points along a continuum (i.e., novice to expert) to link with the categorical ratings. This provided detailed information regarding the skills and characteristics of the improviser at various levels of achievement.

The *Improvisation Achievement Performance Measure* (IAPM) was reviewed by two University of Michigan graduate students enrolled in Jazz and Contemporary Improvisation. Following the guidelines suggested by DeVellis (2003), each expert reviewed the items in each category to confirm relevancy to measuring the underlying construct, to clarify confusing language, and to make suggestions for items not included in the measure. Once the IAPM was revised, it was piloted using the performances from three high school students and one university student ($N = 4$). Analysis of the results of the pilot led to a second version of the IAPM. The two graduate students reviewed the second version of the IAPM and made further

revisions to eliminate redundancies, reducing the number of items from 37 to 15.

The final version of the IAPM (Appendix E) was used for the main study.

Based on similar tests used by Madura (1992) and May (2003), the *Aural Imitation Measure* (AIM)(Appendix F) was developed to evaluate participants' aural acuity and ability to repeat musical motives heard. Jazz improvisation achievement relies on aural perception and understanding, allowing the performer to assimilate what is heard externally or internally and repeating it in sound. Jazz performances frequently feature a practice called "trading fours" where soloists alternate turns improvising for four measures. This interplay between soloists relies heavily upon call and response, where the performers imitate one another and vary the melodic and rhythmic structure of a motive. Noting its use in jazz and the finding that aural imitation ability is a strong predictor of jazz improvisation achievement (Madura, 1992; May, 2003) prompted the development of this measure for this study.

The AIM contains 15 pre-recorded jazz motives performed on piano and divided into three groups: (a) One measure motives (b) two measure motives, and (c) four measure motives. The motives in each group start simply and become increasingly difficult with respect to rhythm and melody. Examples were freely composed by the researcher or borrowed from existing jazz method books (Baker, 1980; Senff, 2000). They were recorded using an M-Audio Keyboard connected to an iMac computer running GarageBand. Once the motives were recorded, a tambourine click track was inserted before each example to indicate the tempo (i.e., quarter note equals 110 beats per minute) for the participant. Finally, the performance track was exported as an MP3 and saved to an iPod.

To facilitate starting on the right pitch (i.e., identifying the correct tonal center), a lead sheet was provided to the performer indicating the starting note of each example. This sheet was composed using Sibelius composition software. A similar procedure was used by May (2004) in her assessment of aural imitation ability.

When conducting the test, each motive was performed two times for the participant, who had two opportunities to play back what was heard. The more accurate of the two responses was scored. The order in which the listening and performing occurs approximates the “trading fours” description explained above. To clarify the procedure to participants, an example procedure of a one-bar motive was provided.

The scoring of the AIM took into account correct pitches (one point), contour and melodic shape of the motive (one point), and rhythm (one point) of each measure. It is common for jazz performers to approximate melodic motives by manipulating one or more of these categories. Therefore, assigning a point to each category allows for some credit to be given if, for example the general contour of the line and the overall rhythm is correct, but the pitches are not. Therefore, each measure received anywhere from a 0 to a 3 point score. The total point value for the pilot test version of the AIM is 105 points.

The AIM was pilot tested with two high school students and a university jazz major. Providing a practice example and explaining the scoring system was helpful for students in understanding the aural imitation procedure. Scores indicated differing levels of aural imitation ability, with the greatest success evident with one-

bar motives among participants. Due to the need for a measure that can provide data for novice improvisers as well as more advanced improvisers, no modifications of the measure seemed necessary.

The *Jazz Theory Measure* (JTM)(Appendix G) was used to evaluate participants' knowledge of jazz theory. Modeled after a theory test used by Jamey Aebersold at his Summer Jazz Workshops, which are open to all levels of improvisation ability, and based on similar measures used by Ciorba (2006), Madura (1992), and May (1994) this theory test consists of twenty multiple-choice questions. The topics covered include chord construction, song forms, scales, and common jazz harmonic chord progressions.

This measure was pilot tested with the same two high school students and university jazz major. Due to limited jazz theory knowledge and experience in a jazz program, the high school students were successful in answering less than half of the questions. The University student, an advanced jazz musician, successfully completed all but one question. This indicated that the *Jazz Theory Measure* provided sufficient measurement of differing levels of basic jazz theory knowledge among participants.

Procedure

In spring 2012, I contacted the music coordinator of a large school district in Michigan and received formal approval to conduct my study at a high school known for its jazz program. The jazz director assisted me by recruiting participants based on a wide variety of improvisation achievement levels. Twenty-six high school

participants agreed to participate by completing assent and parental permission forms (Appendix H and I).

During the same time period, as well as in fall 2012, I contacted the jazz ensemble directors at three Michigan universities to recruit college-age participants. Additionally, in spring 2013, I contacted music education professors at two New York State universities who worked with a large population of music students. Through these efforts, forty-four participants agreed to take part in this study by signing consent forms (Appendix J).

All data were collected on-site by the researcher, either in a practice room or designated classroom where the participants attended school. I arranged times with the jazz directors or music professors, typically around ensemble rehearsal times, to make it easy to excuse participants individually to complete the four assessments in the study. Participants completed the written assessments (i.e., *Participant Improvisation Experience Survey* and *Jazz Theory Measure*) using paper and pencil and then performed the aural imitation and improvisation tasks, (In some cases, participants completed the performance tasks first due to time constraints and/or scheduling challenges.)

For the Aural Imitation Measure (AIM), I explained the task to each participant and provided a lead sheet depicting the starting pitch for each exercise. Each performance was recorded onto a TASCAM DR-1 portable digital recorder. The improvisation task, for which the *Improvisation Achievement Performance Measure* (IAPM) would be used, involved three parts: (a) A free improvisation exercise accompanied by a drone, (b) two choruses of a blues improvisation in F

accompanied by a rhythm section, and (c) two choruses of improvisation with accompaniment over the changes of “Blue Bossa” by Kenny Dorham. The free improvisation exercise was chosen because it limits any audible harmonic (except for the drone) and rhythmic constraints, thereby providing greater melodic and rhythmic possibilities for the improviser. The F blues was chosen because it is one of the fundamental forms found in jazz improvisation and many schools focus on it when teaching improvisation. Finally, “Blue Bossa” was chosen because of its modal characteristics, harmonic simplicity, and bossa nova time feel. Jazz improvisers are expected to improvise in a variety of rhythmic styles and “Blue Bossa” allows for this to be evaluated.

The drone was created using GarageBand. The F blues and “Blue Bossa” accompaniments were produced using iRealb, a software application downloaded to my Ipad. MP3 files of all three accompaniments were loaded onto an Ipad and played on a Bose SoundDock speaker system. Each performance was recorded onto a TASCAM DR-1 portable digital recorder.

Data Analysis

Once collected, the data were organized for analysis. The recordings of the improvisation tasks were loaded onto a computer and transferred to CD for evaluation by the judging panel. The panel, consisting of two graduate students enrolled in Jazz Studies and a professor of Jazz Studies at the University of Michigan, evaluated the improvisation performances using the IAPM (see Appendix K). The resulting evaluative data were merged with the data from the AIM, JTM, and PIES,

and entered into an Excel document for importation into SPSS, Version 21 for statistical analysis.

Central to the statistical analysis and interpretation of the data is the overall evaluation of improvisation achievement provided by the judging panel. Since this is the dependent variable upon which the other variables will be statistically measured, it was important to have reliable and valid rating of each improviser. Internal reliability tests were conducted on the IAPM as well as the other instruments (i.e., PIES, AIM, and JTM), and descriptive analyses were done to assess normal distribution of scores prior to proceeding with the statistical analyses.

A descriptive statistical analysis was conducted to answer the first research question, “What are the jazz improvisation achievement levels of the participants?” A mean score for each participant was calculated from judges’ ratings for use in subsequent statistical tests. The next research question, “What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants’ improvisation achievement?” was answered using a Pearson correlation test between jazz improvisation achievement and the following independent variables: (a) instrument facility, (b) aural imitation ability, (c) jazz theory knowledge, (d) age, (e) level of education, (f) jazz experience, (g) self-assessment of ability, (h) singing, (i) playing of secondary instruments, (j) improvisation on secondary instruments, (k) vocal improvisation, (l) practicing improvisation, (m) perceived confidence while improvising, and (n) listening habits. A multiple regression was then run to further analyze two independent variables (i.e., instrument facility and aural imitation ability) and their relation to

improvisation achievement. Multiple regression is a technique that provides a sophisticated exploration of the relationship(s) between one dependent variable and a number of independent variables. As Pallant (2010) notes, “[Multiple regression] is ideal for the investigation of more complex real-life, rather than laboratory-based, research questions” (p. 148).

In answering the third research question “What developmental tendencies are evident among the variables and jazz improvisation achievement?” a series of one-way analyses of variance were conducted to investigate the correlations found in the second research question. In addition, one-way analyses of variance were conducted on all the categories in the IAPM. Such tests explore the variability or variance between the scores of different groups to determine if they are significant (Pallant, 2010).

Another component of this research question was to examine the perceived challenges participants face and the strategies they use for learning improvisation. For this, I tallied and analyzed the frequency of responses to these questions on the PIES. Finally, I selected three F Blues improvisations from the participant pool and transcribed them for theoretical analysis and for comparison. I based my analysis on the categories found in the *Improvisation Achievement Performance Measure*, to describe the musical characteristics of improvisers at various achievement levels. Such examples give visual representation to qualitative and quantitative differences among various levels of improvisation achievement.

Once the descriptive and multiple regression analyses were complete, I viewed the findings with an eye toward developmental tendencies, expanding upon

the *Developmental Continuum of Improvisation Achievement* found in Chapter 2. Specifically, I grouped the mean scores from the IAPM into three categories (i.e., novice, intermediate, and advanced) and analyzed statistically significant growth among groups in the categories of the IAPM. Such analysis led to a new and more detailed continuum for understanding jazz improvisation development.

CHAPTER IV

RESULTS

This chapter provides the results of the statistical analyses of the data in view of the purpose examining the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement. All data were entered into and analyzed by Statistical Package for the Social Sciences (SPSS, Version 21 for Macintosh, 2012). Reliability tests were conducted for each of the researcher-designed instruments (i.e., AIM, IAPM, JTM, and PIES) and inter-judge reliability was determined for ratings of the participants' overall improvisation achievement levels by all three judges. Descriptive statistics were calculated for all variables and continuous data were tested for normality of distribution. Correlation coefficients were computed for selected variables and standard multiple regression was used to determine which variables serve as predictor variables for jazz improvisation achievement. One-way analyses of variance were conducted on variables with moderate and strong correlations. Finally, transcriptions were made of three improvised F Blues solos and then analyzed for qualitative and quantitative developmental features.

Reliability

Cronbach's alpha was used to determine the internal reliability of each instrument (see Table 4.1). The Cronbach alpha coefficient for AIM, IAPM, and JTM ranged from .85 to .99, suggesting strong internal consistency (DeVellis, 2003). The Cronbach alpha coefficient for PIES was .72, suggesting weaker, yet reliable internal consistency.

Inter-judge reliability. An intraclass correlation coefficient (i.e., ICC) was determined from the ratings of the participants' overall improvisation achievement by all three judges. This statistic was used because there were more than two judges and the ratings were not all the same for each participant (Landers, 2011). A two-way mixed average ICC was calculated in SPSS (i.e., all judges rated the same number of participants and their mean rating was tested for reliability) resulting in strong agreement among all three judges with a coefficient of .85.

Table 4.1

Internal Reliability of Researcher-Designed Measures

Measure	Reliability
Aural Imitation Measure (AIM)	.85
Improvisation Achievement Performance Measure (IAPM)	.99
Jazz Theory Measure (JTM)	.85
Participant Improvisation Experience Measure (PIES)	.72

Improvisation Achievement Levels

To answer the first research question, “What are the jazz improvisation achievement levels of the participants”, a mean score was calculated from the judges’ ratings of the participants’ overall improvisation achievement levels (as measured by IAPM question 16)(Table 4.2). On a six-point scale, where one represents “novice” and six represents “advanced”, the mean scores of participants ranged from 1.33 to 5.33. The concentration of scores was highest between 2.33 and 4.00, suggesting a normal distribution of scores. This is significant in view of the need to use these scores to answer the other research questions using parametric statistics. (Further descriptive statistical analysis of the IAPM scores can be found in Table 4.3).

The averaging of scores resulted in 13 different scores. To simplify this data set to discern possible developmental tendencies, I divided the 13 scores into thirds, which resulted in three categories: (a) Novice (1.33 to 2.67); (b) Intermediate (3.00 to 3.67); and (c) Advanced (4.00 to 5.33). Group 1 (novice) included 27 participants, Group 2 (intermediate) included 27 participants, and Group 3 (advanced) had 16 participants. Although the advanced group had fewer participants, this likely reflects the number of advanced improvisers in society when compared to those of lower achievement levels.

Table 4.2

Central Tendencies of Participants' Jazz Improvisation Achievement (N = 70)

Group	Number of Participants (<i>n</i>)	Mean	Median	Mode
Novice	27	2.17	2.00	2.67
Intermediate	27	3.32	3.33	3.00
Advanced	9	4.29	4.67	4.00

Note. Central tendency values are within the range of 1.00 to 6.00, as found in the IAPM.

Relationships Between Variables

To answer the second research question, "What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement?", it was necessary to determine and examine the correlations between the dependent variable (i.e., jazz improvisation achievement) and the following independent variables: (a) instrument facility, (b) aural imitation ability, (c) jazz theory knowledge, (d) age, (e) level of education, (f) jazz experience, (g) self-assessment of ability, (h) singing, (i) playing of secondary instruments, (j) improvisation on secondary instruments, (k) vocal improvisation, (l) practicing improvisation, (m) perceived confidence while improvising, and (n) listening habits. Descriptive statistics were computed and normal distributions were found for all variables except for listening habits (see Table 4.3), which showed a moderate skewness to the right.

A Pearson product-moment correlation coefficient was used to investigate the relationships between jazz improvisation achievement (dependent variable) and several independent variables as noted above (see Table 4.4). There was a strong,

positive correlation between instrument facility (as measured by the IAPM question 1) and jazz improvisation achievement (as measured by the average final score on the IAPM), $r = .88$, $n = 70$, $p < .00$, indicating that instrument facility is strongly associated with improvisation achievement (Cohen, 1988). A strong, positive correlation was also found between aural imitation ability (as measured by the AIM) and jazz improvisation achievement, $r = .61$, $n = 70$, $p < .02$, indicating that aural imitation ability is strongly associated with jazz improvisation achievement. All other variables had a moderate positive correlation with jazz improvisation achievement, except for singing, $r = .21$, $n = 70$, $p < .09$, which had a weak correlation and lacked statistical significance at $p < .05$, and the playing of secondary instruments, $r = .00$, $n = 68$, $p < 1.00$, which had no correlation nor statistical significance (Cohen, 1988).

In sum, all of the aforementioned independent variables, except for singing and playing of secondary instruments, were found to have a positive relationship with improvisation achievement. To further explore the relationship between the variables found to be strongly correlated with jazz improvisation achievement (i.e., technical facility and aural imitation ability), a standard regression analysis was conducted.

Table 4.3

Descriptive Statistics for IAPM Dependent Variable and Independent Variables

Variable	N	Mean	SD	Skewness	Kurtosis
IAPMAVGQ1	70	3.65	.83	-.34	-.38
THEORYSCORE	70	15.73	4.03	-.52	-.79
AIMSCORE	70	48.74	15.58	.16	-.67
RATEYOURSELF	70	3.03	1.05	-.60	-.36
CONFIDENCE	70	3.14	1.03	.46	-.22
LISTEN*	69	4.06	1.01	1.08	.92
SINGIMPROV	70	3.23	1.19	.30	-.75
SECINSTIMPROV*	68	2.63	1.32	-.39	-.94
PRACTICEIMPROV	70	3.50	1.23	.32	-.91
IMPROVISE	70	3.53	2.26	.79	.33
JAZZEXP*	68	4.41	2.44	.19	-1.34
SING	70	3.84	.91	.40	-.61
PLAYSECONDARY*	68	3.41	1.35	.46	-.92
AGE	70	18.47	2.75	-.18	-1.41
IAPMAVG	70	3.1	.91	.07	-.50

Note. IAPMAVGQ1 = Instrument facility; THEORYSCORE = Jazz theory score; AIMSCORE = Aural imitation score; RATEYOURSELF = Self-assessment of ability; CONFIDENCE = Perceived confidence while improvising; LISTEN: Extent to which one listens to jazz; SINGIMPROV: Extent to which one improvises vocally; SECINSTIMPROV = Extent to which one improvises on secondary instruments; PRACTICEIMPROV = Extent to which one practices improvisation; JAZZEXP = Jazz experience; SING = Extent to which one sings; PLAYSECONDARY: Extent to which one plays secondary instruments; AGE = age; IAPMAVG = Average score for improvisation achievement

*Not all respondents responded to this question.

Table 4.4

Pearson Correlations Between IAPM Dependent Variable and Independent Variables

Variable	<i>N</i>	<i>r</i>	<i>p</i>
IAPMAVGQ1	70	.88	.00
THEORYSCORE	70	.46	.00
AIMSCORE	70	.61	.00
RATEYOURSELF	70	.44	.00
CONFIDENCE	70	.40	.00
LISTEN	69	.33	.01
SINGIMPROV	70	.37	.00
SECINSTIMPROV	68	.40	.00
PRACTICEIMPROV	70	.48	.00
IMPROVISE	70	.44	.00
JAZZEXP	68	.41	.00
SING	70	.21	.09
PLAYSECONDARY	68	.00	1.00
AGE	70	.36	.00
EDUCATION	70	.31	.01

Note. IAPMAVGQ1 = Instrument facility; THEORYSCORE = Jazz theory score; AIMSCORE = Aural imitation score; RATEYOURSELF = Self-assessment of ability; CONFIDENCE = Perceived confidence while improvising; LISTEN: Extent to which one listens to jazz; SINGIMPROV: Extent to which one improvises vocally; SECINSTIMPROV = Extent to which one improvises on secondary instruments; PRACTICEIMPROV = Extent to which one practices improvisation; JAZZEXP = Jazz experience; SING = Extent to which one sings; PLAYSECONDARY: Extent to which one plays secondary instruments; AGE = age; IAPMAVG = Average score for improvisation achievement

Multiple Regression

Multiple regression is a statistical technique used for determining the magnitude of the relationship between the dependent variable and two or more independent variables (Gall et. al, 2007). It provides an indication of the relative contribution each independent variable makes to the variance of the dependent variable (Pallant, 2010). When using multiple regression, sample size is an important consideration for determining the number of independent variables in the equation thereby affecting the significance of the relationship between variables and the generalizability of the findings (Cohen & Cohen, 1983; Pallant, 2010). Due to the sample size of 70 participants, only two independent variables (i.e., instrument facility and aural imitation ability) were used, based on their strong correlation with improvisation achievement.

Standard multiple regression was used to explore the relationships between instrument facility and aural imitation ability (see Table 4.5). Both variables combined to account for 79% of the variance in jazz improvisation achievement, $R^2 = .79$, $F(2, 67) = 130.42$, $p < .001$. Results of the standard multiple regression analysis suggest a model in which both variables show statistical significance, with instrument facility recording a higher beta value ($\beta = .79$, $p < .001$) than aural imitation ability ($\beta = .15$, $p < .03$). In other words, instrumental facility predicts more of the variance than aural imitation ability. Tests for tolerance and variance inflation factor (VIF) were conducted to investigate possible existence of multicollinearity. The tolerance value for both predictors was .66, which is greater

than .10, suggesting sufficient independence. The VIF value was 1.51 for both predictors, which is less than 10, suggesting no existence of multicollinearity between the variables (Pallant, 2010).

Table 4.5

Summary of Regression Analysis of Variables Predicting Improvisation Achievement (N = 70)

Improvisation Achievement			
Variable	B	SEB	β
Aural Imitation	.009	.004	.15*
Technical Facility	.87	.07	.79**
R ²		.79	
F		130.42	

Note. *p < .05. **p < .001

Developmental Tendencies in Improvisation Achievement

In order to answer my third research question, “What developmental tendencies are evident in the analysis of the relationships among the [independent] variables and jazz improvisation achievement?”, it was necessary to compare the means of each of the post hoc researcher-assigned participant groups (i.e., Group 1 - novice, Group 2 - intermediate, Group 3 - advanced) on several of the aforementioned variables. In Tables 4.5 and 4.6, a cursory analysis of the descriptive statistics suggests that all variables, except for playing a secondary instrument (i.e., PLAYSECONDARY, Table 4.5) and singing (i.e., SING, Table 4.5), increase in mean

score from Group 1 (novice) to Group 3 (advanced). To determine the existence of statistical significance in the change of mean scores, a one-way analysis of variance (ANOVA) was conducted.

A series of tests for determining the homogeneity of variances among groups using the Levene method yielded no significant differences for all variables, (p-values were consistently above .05) except for practicing improvisation (i.e., PRACTICEIMPROV). Because a violation of assumption for homogeneity of variance appeared for practicing improvisation, Welch and Brown-Forsythe tests were conducted on this variable and the robustness of the equality of means was deemed acceptable ($p < .0005$). Therefore, homogeneity of variance was assumed and comparisons of independent variable means were carried out with confidence using a series of ANOVAs (see Table 4.6).

Significant differences were detected for improvisation experience, jazz experience, practicing improvisation, perceived self-confidence, self-assessment, aural imitation score, and jazz theory score. The effect sizes for these variables ranged from eta squared = .11 to .29, suggesting medium to large effect sizes (Cohen, 1988). To determine which of the groups significantly differ, post-hoc comparisons using the Tukey HSD test revealed that for improvisation experience, confidence, self-assessment, jazz theory score the mean score for Group 1 (see Table 4.5) was significantly different from Group 3. Group 2 did not differ significantly from either group. For jazz experience, the mean score for Group 1 was significantly different from Group 2 and Group 3, though the latter two did not show significant differences when compared. In practicing improvisation, a Games-Howell test

indicated there was a significant difference between Groups 1 and 3, as well as Groups 2 and 3. No significant difference appeared between Groups 1 and 2. And for aural imitation, there were significant differences between the means of all groups. Although these post-hoc tests are helpful in determining where the significant differences occur within groups, the fact that a significant difference is detected between Group 1 and Group 3 in each of these examples suggests developmental propensity.

Comparing the means of performance ratings among groups on the IAPM yielded statistically significant results in all categories (see Table 4.8). The effect sizes for these variables largely exceeded the eta squared value of .14, indicating a large effect for each category (Cohen, 1988). Post-hoc comparisons using the Tukey HSD test revealed that there were significant differences between the means of all groups in each category. This suggests the categories of technique, rhythm/time feel, harmony, melodic/rhythmic development, style, expressivity, and creativity can be considered in a developmental analysis and confirms the construct validity of the IAPM.

Table 4.6

Comparison of Means by Participant Group and Independent Variables

Variable	Group 1 (Nov.) <i>M</i>	Group 1 (Nov.) <i>SD</i>	Group 2 (Int.) <i>M</i>	Group 2 (Int.) <i>SD</i>	Group 3 (Adv.) <i>M</i>	Group 3 (Adv.) <i>SD</i>
IMPROVISE	2.70	2.22	3.63	2.20	4.75	1.92
JAZZEXP	3.32	2.23	5.00	2.30	5.13	2.50
PLAYSECONDARY	3.48	1.53	3.44	1.16	3.25	1.44
SING	3.59	1.08	4.00	0.88	4.00	0.52
PRACTICEIMPROV	3.07	1.00	3.33	1.36	4.50	0.73
SECINSTIMPROV	2.35	1.29	2.54	1.14	3.25	1.48
SINGIMPROV	2.96	1.26	3.19	1.27	3.75	0.78
LISTEN	3.70	1.03	4.27	0.83	4.31	1.14
CONFIDENCE	2.78	1.16	3.19	0.92	3.69	0.70
RATEYOURSELF	2.63	1.15	3.15	0.95	3.50	0.82
AIMSCORE	38.81	12.28	52.15	3.96	59.75	12.65
THEORYSCORE	13.48	3.88	15.81	3.96	16.75	3.66

Note. IMPROVISE = Years of improvisation experience; JAZZEXP = Years of jazz experience; PLAYSECONDARY = Extent to which one plays a secondary instrument; SING = Extent to which one sings; PRACTICEIMPROV = Extent to which one practices improvisation; SECINSTIMPROV = Extent to which one improvises on secondary instruments; SINGIMPROV = Extent to which one improvises vocally; LISTEN = Extent to which one listens to jazz; CONFIDENCE = Perceived confidence while improvising; RATEYOURSELF = Self-assessment of ability; AIMSCORE = Aural imitation score; THEORYSCORE = Jazz theory score

Table 4.7

Comparison of Means by Participant Group and IAPM Categories

Variable	Group 1 (Nov.) <i>M</i>	Group 1 (Nov.) <i>SD</i>	Group 2 (Int.) <i>M</i>	Group 2 (Int.) <i>SD</i>	Group 3 (Adv.) <i>M</i>	Group 3 (Adv.) <i>SD</i>
IAPMAVGQ1	2.85	0.56	3.91	0.43	4.56	0.38
IAPMAVGQ2	2.63	0.49	3.49	0.45	4.02	0.45
IAPMAVGQ3	2.41	0.47	3.23	0.43	3.98	0.45
IAPMAVGQ4	2.41	0.49	3.28	0.37	4.02	0.52
IAPMAVGQ5	1.42	0.18	1.91	0.35	2.73	0.69
IAPMAVGQ6	2.31	0.51	3.28	0.37	4.10	0.43
IAPMAVGQ7	2.31	0.41	3.36	0.44	4.13	0.58
IAPMAVGQ8	2.32	0.47	3.36	0.37	4.08	0.64
IAPMAVGQ9	2.22	0.42	3.27	0.44	4.17	0.60
IAPMAVGQ10	2.46	0.49	3.43	0.40	4.42	0.43
IAPMAVGQ11	2.25	0.62	3.26	0.46	4.23	0.50
IAPMAVGQ12	2.44	0.51	3.33	0.52	4.21	0.57
IAPMAVGQ13	2.43	0.52	3.31	0.47	4.19	0.50
IAPMAVGQ14	2.19	0.42	2.91	0.35	3.67	0.58
IAPMAVGQ15	2.25	0.46	3.19	0.37	4.08	0.52

Note. IAPMAVGQ1 = Instrument facility; IAPMAVGQ2 = Ability to play with good time; IAPMAVGQ3 = Ability to demonstrate rhythmic definition while floating atop the time feel; IAPMAVGQ4 = Ability to play within the chord changes; IAPMAVGQ5 = Demonstration of advanced harmonic knowledge when playing; IAPMAVGQ6 = Ability to create melodic solo lines; IAPMAVGQ7 = Use of patterns and licks; IAPMAVGQ8 = Use of motivic development in the solo; IAPMAVGQ9 = Demonstration of a rich knowledge base of melodic and rhythmic ideas; IAPMAVGQ10 = Demonstration of awareness for shaping lines and performing logical phrases; IAPMAVGQ11 = Demonstration of solid eighth note lines; IAPMAVGQ12 = Ability to perform articulations, tone, and rhythmic feel appropriate to song style; IAPMAVGQ13 = Demonstration of passion and character; IAPMAVGQ14 = Demonstration of sensitivity towards use of space, including responding to accompaniment; IAPMAVGQ15 = Demonstration of originality through improvisation

Table 4.8

ANOVA Summary for Differences Among Groups for Independent Variables

Variable	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
IMPROVISE					
Between	42.52	2	21.26	4.61	.01
Within	308.93	67	4.61		
Total	351.44	69			
JAZZEXP					
Between	47.28	2	23.64	4.38	.02
Within	351.19	65	5.40		
Total	398.47	67			
PRACTICEIMPROV					
Between	21.65	2	10.82	8.86	.00
Within	81.85	67	1.22		
Total	103.50	69			
SECINSTIMPROV					
Between	8.46	2	4.23	2.56	.09
Within	107.35	65	1.65		
Total	115.81	67			
SINGIMPROV					
Between	6.31	2	3.15	2.30	.11
Within	92.04	67	1.37		
Total	98.34	69			
LISTEN					
Between	5.59	2	2.79	2.87	.06
Within	64.18	66	.97		
Total	69.77	68			
CONFIDENCE					
Between	8.39	2	4.20	4.38	.02
Within	64.18	67	.96		
Total	72.57	69			
RATEYOURSELF					
Between	8.24	2	4.12	4.08	.02
Within	67.70	67	1.01		
Total	75.94	69			
AIMSCORE					
Between	4912.89	2	2456.45	13.90	.00
Within	11842.48	67	176.75		
Total	16755.37	69			
THEORYSCORE					
Between	128.03	2	64.01	4.33	.02
Within	989.82	67	14.77		
Total	1117.84	69			

Table 4.9

ANOVA Summary for Differences Among Groups for IAPM Categories

Variable	SS	df	MS	<i>f</i>	<i>p</i>
IAPMAVGQ1					
Between	32.40	2	16.20	71.15	.00
Within	15.25	67	0.23		
Total	47.65	69			
IAPMAVGQ2					
Between	21.44	2	10.72	49.58	.00
Within	14.48	67	0.22		
Total	35.92	69			
IAPMAVGQ3					
Between	25.79	2	12.90	63.11	.00
Within	13.69	67	0.20		
Total	39.49	69			
IAPMAVGQ4					
Between	27.42	2	13.71	66.13	.00
Within	13.89	67	0.21		
Total	41.31	69			
IAPMAVGQ5					
Between	17.23	2	8.61	51.52	.00
Within	11.20	67	0.17		
Total	28.43	69			
IAPMAVGQ6					
Between	33.95	2	16.98	87.73	.00
Within	12.97	67	0.19		
Total	46.92	69			
IAPMAVGQ7					
Between	35.46	2	17.73	81.33	.00
Within	14.61	67	0.22		
Total	50.07	69			
IAPMAVGQ8					
Between	33.61	2	16.81	73.54	.00
Within	15.31	67	0.23		
Total	48.93	69			
IAPMAVGQ9					
Between	39.68	2	19.84	87.88	.00
Within	15.13	67	0.23		
Total	54.81	69			
IAPMAVGQ10					
Between	39.59	2	19.80	100.38	.00
Within	13.21	67	0.20		
Total	52.81	69			
IAPMAVGQ11					
Between	40.73	2	20.36	71.69	.00
Within	19.03	67	0.28		
Total	59.76	69			
IAPMAVGQ12					
Between	32.16	2	16.08	57.79	.00
Within	18.64	67	0.28		
Total	50.79	69			

Table 4.9 Continued

IAPMAVGQ13					
Between	31.79	2	15.89	64.14	.00
Within	16.60	67	0.25		
Total	48.39	69			
IAPMAVGQ14					
Between	22.57	2	11.29	58.74	.00
Within	12.87	67	0.19		
Total	35.44	69			
IAPMAVGQ15					
Between	34.96	2	17.48	88.68	.00
Within	13.21	67	0.20		
Total	48.17	69			

Strategies and Challenges for Learning Improvisation

In the PIES, participants were asked to select which strategies they used (Table 4.9) and which challenges they faced (Table 4.10) in learning how to improvise. Among the most frequent strategies, respondents in all three groups cited “improvising in a school jazz band or combo” ($n = 52$), “listening/playing along with recordings” ($n = 50$), “jamming with my friends outside of school” ($n = 48$) and “practicing scales” ($n = 46$). Except for “practicing scales”, these strategies are social in nature, even playing along with a recording, suggesting the importance of communication and interaction with others as a fundamental aspect of learning jazz improvisation. This suggests social interaction and engagement may be a facilitating factor for jazz improvisation achievement.

The most frequent challenges all three groups cited were “having enough musical ideas to play a longer solo” ($n = 43$), “having the instrumental technique to play what I want to hear” ($n = 41$), “knowing a wide variety of jazz songs” ($n = 35$), and “feeling a sense of satisfaction while improvising” ($n = 35$). Such challenges pinpoint perceived individual weaknesses across all levels of improvisation

achievement. Such data are important in considering the perceived factors improvisers wish to develop to facilitate greater improvisation achievement.

Changes in Improvisation Achievement Levels

In my efforts to further answer the question “What are the changes that occur from one level of improvisation achievement to the next,” I transcribed one jazz improvisation solo from each group. Specifically, I chose to transcribe the F blues because it is one of the fundamental forms found in jazz improvisation and many schools focus on it when teaching improvisation. By transcribing a solo from each group, I was able to compare visual features of the solos to describe qualitative and quantitative differences between achievement levels. All solos are transcribed in concert pitch (C).

Figure 4.1 is an example of a trumpet solo from Group 1. This participant’s overall improvisation achievement score was 1.33, and for the purpose of this study is considered a novice. As the notation indicates, despite having some technical facility on his instrument, the soloist rarely plays chord tones,

Table 4.10

Frequency of Response for Strategies Used in Learning Improvisation

Strategy	Group 1	Group 2	Group 3	Total
Improvising in a school jazz band or combo	18	21	13	52
Listening/playing along with recordings	19	17	14	50
Jamming with my friends outside of school	13	20	15	48
Practicing scales	16	18	12	46
Improvising to play-along recordings	10	17	10	37
Transcribing jazz solos	9	16	12	37
Studying jazz theory	12	14	9	35
Playing at jam sessions	7	15	12	34
Studying improvisation with a teacher	11	11	11	33
Memorizing licks or riffs	7	11	12	30
Learning to play melodies and licks in all keys	6	8	11	25
Taking a class in improvisation	6	12	4	22
Playing with professional jazz ensembles	1	4	6	11
Other approaches*	1	3	4	8

*Other approaches include: (a) composing/improvising original songs; (b) ear training and singing to jazz radio; (c) composing melodic lines and improvising harmonies; (d) free improvisation; (e) composing solos over existing chord changes; (f) recording one's own improvisations

Table 4.11

Frequency of Response for Challenges in Learning Improvisation

Challenge	Group 1	Group 2	Group 3	Total
Having enough musical ideas to play a longer solo	12	22	9	43
Having the instrumental technique to play what I hear	16	19	6	41
Knowing a wide variety of jazz songs	13	14	8	35
Feeling a sense of satisfaction while improvising	10	16	9	35
Playing the correct chord changes	15	12	6	33
Feeling comfortable and confident	14	11	8	33
Being able to listen to what I'm playing and decide on what to play next	12	11	7	30
Being able to keep track of where I am in the song	13	10	3	26
Being able to play by ear	12	7	5	24
Listening to and communicating musically to people around me	7	9	2	18
Playing from memory	6	5	6	17
Being able to read the chord changes	3	8	1	12
Other challenges*	2	3	4	9

*Other challenges include: (a) Reoccurring ideas; (b) Remembering chord changes to common jazz forms; (c) Sounding rhythmic; (d) Choosing to play a memorized lick or creating something new; (e) Feeling of inadequacy when comparing with other instrumentalists; (f) Playing with good feel; (g) Leaving space

suggesting a lack of harmonic understanding. He plays many syncopated rhythms and repeated figures, but does not vary the rhythmic feel beyond a few sixteenth notes in measure 8 or triplets in measure 33. The motives are short, lacking solid eighth note lines, and the phrasing is not consistently logical. The lack of rests indicates his lack of sensitivity towards space when improvising. Developmentally, his understanding of rhythm and swing feel is more advanced than his tonal and harmonic understanding.

Figure 4.1. F Blues Trumpet Solo Transcription

F Blues
Group 1: Trumpet

Swing

8

14

20

27

32

Figure 4.2 shows an example of a trombone solo from Group 2. This participant's overall jazz improvisation achievement score was 3.33, indicating an intermediate level of achievement. This soloist demonstrates an understanding of

the harmonic language by playing within the chord structure (i.e., focusing on playing chord tones) and using non-chord tones as passing tones or to build tension (e.g., see measures 17-19). The soloist also demonstrates awareness for shaping lines, performing logical phrases, exhibiting melodic sensitivity and intention. Idiomatic use of the glissando throughout and other tonal characteristics, such as growling, suggest knowledge of the style while giving the solo distinctive character. He builds tension through repetition (e.g., measures 23-24 and 27) and shows some awareness of space by allowing for rests at certain points (e.g., measures 19-20, 29, 33). Another noteworthy feature is the use of the minor tonality in the third chorus (i.e., measure 25-27), which suggests an intuitive desire for a different sound or affect by the soloist. This indicates an awareness of what has transpired and a desire to create something new.

Figure 4.3 illustrates a piano solo from Group 3. This participant received an overall rating of 4.33 for jazz improvisation achievement, which is considered advanced for this study. The soloist's technical facility on the piano is evident in her ability to alternate and play with both hands a variety of voicings and scale patterns. She demonstrates an advanced understanding of the harmonic language by playing chord tones and extensions in the melody and harmonic accompaniment in the left hand. Her melodic lines frequently use chromatic tones (e.g., measures 7, 10, 11, 18, 36), which create tension until resolved to chord tones, indicating a sophisticated approach to melodic construction. The soloist also demonstrates awareness for shaping lines, performing logical phrases, exhibiting melodic sensitivity and intention. She alternates eighth note lines with chordal motives, while maintaining

an on-going sense of rhythmic definition while floating atop the time feel. The soloist also demonstrates sensitivity to towards use of space in her solo (e.g., measures 1-3, 15-16, 19, 27).

Figure 4.2. F Blues Trombone Solo Transcription

F Blues
Group II: Trombone

Swing

The musical score is written in bass clef with a key signature of one flat (Bb) and a 4/4 time signature. It consists of six staves of music, each containing measures 1 through 33. The notation includes various musical symbols such as eighth notes, quarter notes, half notes, and rests. There are several triplet markings (indicated by a '3' and a bracket) and two 'Growl' markings above the staff. The score ends with a double bar line and repeat dots.

Figure 4.3. F Blues Piano Solo Transcription

F Blues
Group III: Piano

Swing

The musical score is written for piano in 4/4 time, F major. It is divided into six systems of music. The first system starts with a key signature change to F major (one flat) and a time signature change to 4/4. The second system begins at measure 9. The third system begins at measure 14. The fourth system begins at measure 20. The fifth system begins at measure 26. The sixth system begins at measure 32. The score includes various musical notations such as eighth notes, quarter notes, half notes, and chords. There are also performance markings like '8va' with a dashed line and '3' indicating triplets. The piece concludes with a double bar line at the end of the sixth system.

When considered collectively, the transcriptions above provide visual insights into the ways in which each group differs developmentally in improvisation achievement. The trumpet soloist in Group 1 exhibited limited understanding of the

harmonic language in the F Blues. Even though he had some technical facility and some knowledge of swing feel, his overall knowledge base for creating an original solo was limited. In contrast, the trombone soloist in Group 2, displayed a richer knowledge base in his solo due to his use frequent use of chord tones, idiomatic characteristics, such as the glissando and growl, rhythmic variety, and clear melodic intention. The piano soloist in Group 3 displayed similar characteristics while adding more harmonic sophistication and rhythmic variation to her solo. Over the course of the three solos, there is a greater attention to sensitivity towards space and an awareness of what occurred and what might come next (i.e., evaluative monitoring). And the sense of flow in the solos becomes more fluid from Group 1 to Group 3. Although all three soloists demonstrated understanding of the blues as a referent, the depth of understanding increased from Group 1 to Group 3 as evidenced by the increasingly complex creation of harmonic, rhythmic, and melodic ideas.

Summary

The purpose of this chapter was to provide the results of the statistical and theoretical analyses of the data as prompted by the research questions. The chapter began with a reliability report on all measures used in the study. All measures were determined to be reliable. The first research question – *What are the jazz improvisation achievement levels of the participants?* – was answered by calculating a mean score among the judges' ratings of each participant. These scores were then divided into three groups: (a) novice, (b) intermediate, and (c) advanced, for use in further analyses.

Correlation tests were conducted for the second research question – *What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement?*

Strong, positive correlations were found between instrument facility and improvisation achievement as well as aural imitation ability and improvisation achievement. Moderate, positive correlations were found for theory knowledge, self-assessment, confidence, listening habits, vocal improvisation, secondary instrument improvisation, improvisation practice, improvisation experience, jazz experience, and age. Singing and playing secondary instruments lacked statistical significance.

To further investigate the type of relationships between instrument facility, aural imitation ability and improvisation achievement, a standard multiple regression analysis was conducted. The results confirmed instrument facility and aural imitation ability are suitable predictors of improvisation achievement.

Further examination of the moderate, positive correlations between the other variables and improvisation achievement was done using a one-way analysis of variance. Significant differences were detected for improvisation experience, jazz experience, practicing improvisation, perceived self-confidence, self-assessment, aural imitation score, and jazz theory score. Similarly, a one-way analysis of variance was conducted on all categories of the IAPM to determine significant changes in all categories between groups. Comparing the means of performance ratings among groups on the IAPM yielded statistically significant results in all categories.

Strategies used by participants to learn improvisation and perceived challenges with improvising were analyzed using descriptive statistics. Respondents in all three groups cited “improvising in a school jazz band or combo”, “listening/playing along with recordings”, “jamming with my friends outside of school”, and “practicing scales” as the most common strategies. The most cited challenges were “having enough musical ideas to play a longer solo”, “having the instrumental technique to play what I want to hear”, “knowing a wide variety of jazz songs”, and “feeling a sense of satisfaction while improvising”.

Finally, I randomly selected three F Blues improvisations for transcription. This process enabled me to compare visual features of the solos, showing another view of the data and the qualitative and quantitative differences between achievement levels. Overall, the transcriptions depict an accumulation of improvisatory skills and knowledge from Group 1 to Group 3.

The next chapter discusses the results of this study in relation to previous research on improvisation, suggesting a preliminary model for improvisation development and making suggestions for further research.

CHAPTER V

DISCUSSION, IMPLICATIONS, AND CONCLUSION

This chapter discusses the results of this study, providing implications and suggestions for future research. I begin the chapter with an overview of the study, including relevant past research that led to the purpose, research questions, general methodology for data collection and analysis, and a summary of the results. Next, I present the discussion of the results in relation to past research, synthesizing the findings in a preliminary model of jazz improvisation development. Finally, I provide implications this research has for music education, suggestions for further research, and the conclusion.

Summary of Related Research on Improvisation

The purpose of this study was to examine the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement. I began my inquiry into improvisation with a review of related literature. Chapter 2 consists of a review of several areas of research and theoretical writings on improvisation including (a) an overview of improvisation in American music education, (b) cognitive and motor processes of improvisation, (c) research of improvisation in education, and (d) a model of improvisation development.

Over the past few decades, research and study of the art and practice of improvisation has grown significantly (Berkowitz, 2009; Biasutti & Frezza, 2009; Ciorba, 2009; Flohr, 1979; Madura, 1996; May, 2003; McPherson, 1993, 2005; Norgaard, 2011; Solis & Nettle, 2009; Watson, 2010). This may be attributed to increased interest in and discussion of creative music making since the Yale Seminar (1963), Tanglewood Symposium (1967), and the eventual development of the National Standards for Arts Education (1994). When these standards were published, improvisation became one of nine competencies in music education.

Research into the cognitive and motor processes utilized in musical improvisation (Berkowitz, 2009; Biasutti & Frezza, 2009; Johnson-Laird, 2002; Kenny & Gellrich, 2002; Norgaard, 2011; Solis & Nettle, 2009) has led to understanding it as a highly complex, multi-dimensional process. It involves various degrees of constraints, knowledge, attention, memory, technical fluency, evaluative monitoring, flow, and expertise. These mental processes were taken into consideration when formulating research questions that target developmental characteristics of improvisation achievement.

Within music education, topics that have received attention among researchers include the development of improvisation ability among young children (Beegle, 2006; Brophy, 2005; Guilbault, 2009; Kiehn, 2003; Koutsoupidou & Hargreaves, 2009; Mang, 2005), factors that predict jazz improvisation achievement (Ciorba, 2009; Madura, 1996; May, 2003), and the type of instruction and its effect on improvisation achievement (Heil, 2005; Rowlyk, 2008; Watson, 2010). Some important themes that emerge from this research include: (a) As children grow

older, their improvisation becomes more purposeful and complex (Brophy, 2005; Flohr, 1978; Kiehn, 2003; Mang, 2005; Moorhead & Pond, 1978); (b) improvisers draw upon a wide storehouse of knowledge (e.g., referents and musical skills) when improvising (Beegle, 2006; Mang, 2005; Moorhead & Pond, 1978; Norgaard, 2011); (c) intentional teaching strategies and curriculum for developing improvisational skill are effective (Burnsed, 1978; Heil, 2005); (d) singing and playing an instrument or multiple instruments positively influences improvisation achievement (Heil, 2005; McPherson, 1993) as does jazz theory knowledge, self-assessment, and aural imitation (Ciorba, 2009; May, 2003); (e) improvisation at expert levels involves sketch planning, evaluative monitoring, rich knowledge base, harmonic and melodic directive influences, and excellent recall/memory skills (Norgaard, 2011); and (f) regular practice of improvisation leads to greater improvisation achievement (Heil, 2005; McPherson, 1993).

Although a systematically created model of improvisation development does not exist in previous literature, an approach to teaching improvisation by Kratus (1996) contains a developmental explanation of the improvisation process. He suggests there are seven stages: (a) exploration; (b) process-orientated improvisation; (c) product-orientated improvisation; (d) fluid improvisation; (e) structural improvisation; (f) stylistic improvisation; and (g) personal improvisation. This explanation was meant to describe improvisation in general, rather than a specific kind, such as jazz improvisation. It served as a helpful starting point in generating questions for the systematic study of jazz improvisation as well as a

comparative resource in creating my own model for understanding improvisation development.

Purpose

My review of the related literature helped to identify skills, characteristics, and capacities that musicians use when improvising. My desire to further investigate these skills and characteristics in relation to improvisation achievement led to the development of my purpose statement and research questions. The purpose of this study was to examine the role aural imitation ability, jazz theory knowledge, and personal background variables play in the development of jazz improvisation achievement.

Research Questions

1. What are the jazz improvisation achievement levels of the participants?
2. What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement? Subquestions include:
 - a. What is the relationship between instrument facility (motor skills) and improvisation achievement level?
 - b. What is the relationship between improvisation achievement level and the following background variables: (a) Age, (b) level of education, (c) improvisation experience (number of years studied), (d) jazz experience, (e) self-assessment of ability, (f) singing, (g) playing secondary instruments, (h) improvisation on secondary instruments, (i) vocal

improvisation, (j) practicing improvisation, (k) perceived confidence while improvising, and (l) listening habits?

3. What developmental tendencies are evident in the analysis of the relationships among the variables and jazz improvisation achievement?
 - a. What are the characteristics of improvisation achievement that determine different levels from novice to expert?
 - b. What are the changes that occur from one level of improvisation achievement to the next?
 - c. What are the perceived challenges of learning improvisation at various levels of achievement?
 - d. What strategies do participants use for learning improvisation at different levels of achievement?

Summary of Method and Analysis

Music teachers at high school and collegiate institutions were contacted for assistance in recruiting instrumental musicians for this study. Through a stratified purposeful sampling procedure, 70 instrumentalists with jazz experience chose to participate. Data collection was conducted using four researcher-designed measures combined with audio recordings. The *Participant Improvisation Experience Survey* (PIES)(see Appendix A) gathered demographic and improvisation performance experience data from the participants. The *Improvisation Achievement Performance Measure* (IAPM)(Appendix D) is a Likert-type rating scale that measured expert judges' perceptions of improvisation achievement among participants. The *Imitative Ability Measure* (IAM)(Appendix F) was used to evaluate participants' aural acuity

and ability to repeat musical motives heard. The *Jazz Theory Measure* (JTM)(Appendix G) was used to evaluate participants' knowledge of jazz theory.

Once collected, the data were organized for analysis. The first research question was answered by calculating a mean score among the judges' ratings of each participant. The second research question was answered using a series of correlation tests and a multiple regression analysis. The third research question was answered using a series of one-way analyses of variance (ANOVAs), frequency counts of data from the PIES, and theoretical analysis of notational transcriptions from the audio recordings.

Summary of Results

Research Question 1. *What are the jazz improvisation achievement levels of the participants?* Participants' scores ranged from 1.33 to 5.33, where 1 is novice and 6 is advanced. For use in answering subsequent research questions, I chose to group the mean scores into three categories: (a) Novice (1.33 to 2.67); (b) Intermediate (3.00 to 3.67); and (c) Advanced (4.00 to 5.33).

Research Question 2. *What is the relationship between aural imitation ability, jazz theory knowledge, personal background variables and the levels of participants' improvisation achievement?* Strong, positive correlations were found between instrument facility, $r = .88, n = 70, p < .001$, and improvisation achievement as well as aural imitation ability and improvisation achievement, $r = .61, n = 70, p < .02$. Moderate, positive correlations were found between improvisation achievement and theory knowledge, self-assessment, confidence, listening habits, vocal improvisation, secondary instrument improvisation, improvisation practice,

improvisation experience, jazz experience, and age. Singing, $r = .21$, $n = 70$, $p < .09$, and playing secondary instruments, $r = .00$, $n = 68$, $p < 1.00$, did not significantly correlate with improvisation achievement. A standard multiple regression analysis confirmed instrument facility and aural imitation ability are suitable predictors of improvisation achievement, $R^2 = .79$, $F(2, 67) = 130.42$, $p < .001$.

Research Question 3. *What developmental tendencies are evident in the analysis of the relationships among the variables and jazz improvisation achievement?*

Improvisation experience, jazz experience, practicing improvisation, perceived self-confidence, self-assessment, aural imitation score, and jazz theory score appeared to significantly improve at higher levels of improvisation achievement among participant groups. Similarly, the musical characteristics and skills of instrument facility, rhythm/time feel, harmony, melody/rhythmic development, style, expressivity, and creativity improved among groups based on achievement level.

What are the characteristics of improvisation achievement that determine different levels from novice to expert? In this study, the categories of the IAPM, specifically instrument facility, rhythm/time feel, harmony, melody/rhythmic development, style, expressivity, and creativity, as well as aural imitation ability (as measured by the AIM) are the characteristics of improvisation achievement.

What are the changes that occur from one level of improvisation achievement to the next? The changes are the improvement in musical characteristics and skills of instrument facility, rhythm/time feel, harmony, melody/rhythmic development, style, expressivity, and creativity, as measured by the IAPM, and in aural imitation, as measured by the AIM. Although the improvised product may be analyzed

quantitatively (e.g., frequency of melodic ideas), the changes that occur from one level to the next are primarily qualitative in nature.

What are the perceived challenges of learning improvisation at various levels of achievement? The most often cited challenges were “having enough musical ideas to play a longer solo,” “having the instrumental technique to play what I want to hear,” “knowing a wide variety of jazz songs,” and “feeling a sense of satisfaction while improvising.”

What strategies do participants use for learning improvisation at different levels of achievement? Respondents in all three groups cited “improvising in a school jazz band or combo,” “listening/playing along with recordings,” “jamming with my friends outside of school,” and “practicing scales” as the most common strategies.

Discussion

The results of this study indicate that aural imitation ability and instrument facility are predictors for jazz improvisation achievement. Improvisation experience, jazz experience, practicing improvisation, perceived self-confidence, self-assessment, and jazz theory are important variables that play a role in the development of improvisation achievement, though further study is needed. The musical characteristics and skills of rhythm/time feel, harmony, melody/rhythmic development, style, expressivity, and creativity are amenable to developmental analysis in jazz improvisation achievement.

The finding that aural imitation ability can serve as a predictor for jazz improvisation achievement confirms similar findings by Ciorba (2006) and Madura (1992). The ability to hear both external and internal sound sources and reproduce

what is heard is a fundamental process linked to improvisation achievement. This process is also linked to the physical manipulation (i.e., technical facility) of an instrument.

One's aural imitation ability is dependent upon strong technical facility on an instrument. Superior technical facility provides the capacity for a high level of improvisation achievement, assuming the improviser also has the requisite skills and knowledge for jazz improvisation. The technical facility serves the improviser in audibly producing what is heard. As Pressing (1988) suggests, improvisational ability is linked to skill development, involving "efficiency, fluency, flexibility, capacity for error correction...expressiveness...inventiveness and achievement of coherence" (p. 27). As technical skills improve, the musician's attention is directed toward higher-level thinking processes (Berkowitz, 2009), such as expressiveness, novelty, and coherence. As this study found, technical facility serves as a predictor of improvisation achievement, confirming a similar finding by McPherson (1993) in which improvisation ability was significantly correlated with performance proficiency.

Regarding the developmental tendencies among the three groups of participants, the data suggest that jazz improvisation achievement is not dependent on age. In previous studies on improvisation involving children, improvisation became more purposeful and complex as a result of maturation (Brophy, 2005; Flohr, 1978; Kiehn, 2003; Mang, 2005; Moorhead & Pond, 1978). As children grew older, improvisations contained more use of motives, referents, and phrase structure. In this study, a specific and highly stylized form of improvisation, growth

in complexity (i.e., achievement) was found dependent on technical facility, aural imitation ability, and a specialized knowledge base in the jazz idiom.

Findings in previous studies also suggest that improvisers draw upon a wide storehouse of knowledge (e.g., referents and musical skills) when improvising (Beegle, 2006; Mang, 2005; Moorhead & Pond, 1978; Norgaard, 2011). In this study, improvisers demonstrated their knowledge bases through three different improvisation tasks. The drone in C had few constraints other than time and pitch. Improvisers were free to play in any mode, in any style, and at any tempo. The F Blues, a common form found in jazz music, was more constrained through a specific chord progression, tempo, and overall form. It demanded specific stylistic knowledge by the improviser for creating an authentic sounding solo. Similarly, “Blue Bossa” by Kenny Dorham, considered a jazz standard and based on the Bossa Nova feel, demands specific knowledge of rhythm/feel, form, and harmony for creating an authentic solo. Those who demonstrated flexibility, fluency, and expressiveness in their solos across all three tasks demonstrated richer knowledge bases, depicting a higher level of achievement. Thus, building both procedural and declarative knowledge bases through practice and study is an important part of developing one’s ability to improvise in the jazz idiom.

In this study, singing and playing a secondary instrument did not correlate with improvisation achievement, contradicting findings by Heil (2005) and McPherson (1993). The reason for this finding may be the limitation of the survey instrument in producing data to study this correlation. Simply asking for the extent to which someone sings or plays a secondary instrument is not sufficiently specific.

Designing measures for studying the interaction between singing, playing multiple instruments and improvisation would be worthwhile

Although jazz theory knowledge was not found to be a predictor of jazz improvisation achievement, as in studies by Ciorba (2006) and Madura (1992), it was found to have a significant relationship with the development of jazz improvisation achievement. This minor discrepancy may likely be attributed to the use of a different jazz theory measure than those used in previous studies. It may be difficult to achieve consensus on what should be included in such a test; however, consistency will help in comparing findings across studies. Another consideration is that musicians with superior aural imitation ability are capable of internally hearing and produce harmonically complex musical passages without verbally knowing their theoretical name or function. Some talented young jazz musicians seem to demonstrate this prior to enrolling in formalized study in school programs.

Self-assessment was also significantly correlated with jazz improvisation achievement, confirming similar findings by Ciorba (2006) and May (2003). This finding suggests that improvisers are aware of their improvisatory capabilities and rate themselves accordingly. In addition, one's skill in self-assessment increases with jazz improvisation achievement. This ability is necessary in recognizing one's strengths and weaknesses so s/he can use strategies to overcome various challenges in order to improve.

Furthermore, jazz experience was significantly correlated with improvisation achievement. This was also a key finding in Madura's (1992) research: The more

one practices in a stylistic domain (i.e., jazz), the better one becomes at performing in that domain.

As noted, the most cited challenges for improvising by participants were “having enough musical ideas to play a longer solo”, “having the instrumental technique to play what I want to hear”, “knowing a wide variety of jazz songs”, and “feeling a sense of satisfaction while improvising”. Having plentiful musical ideas and knowing a variety of jazz songs indicate a need and recognition for building the knowledge base. Having the technique to play what is heard indicates the need for stronger aural imitation ability. And feeling a sense of satisfaction indicates the sense of flow improvisers wish to experience when performing.

The three most common strategies cited by participants for developing their abilities were “improvising in a school jazz band or combo”, “listening/playing along with recordings”, and “jamming with my friends outside of school”. These indicate that improvisation is a social practice, where improvisers learn from others. This is facilitated by their aural imitation abilities, which develop as they play along with other musicians, recorded or live.

Towards a Developmental Continuum

As I noted at the beginning of this chapter, this study was driven by a single question: How does a jazz musician develop the ability to improvise? Imbedded within this question were questions such as: (a) What are the characteristics or milestones that represent a level of development? (b) What prompts movement from one level to the next? Or more simply, how does one advance? (c) Is improvisation achievement dependent on a continuous, amalgamative process, or a discontinuous process? (Hargreaves, 1996; Miller, 1989).

Developmental theories arise from empirical data that demonstrate qualitative and/or quantitative changes in one or more areas of behavior, over time. In this study, the behavior studied was improvisation achievement. The changes (e.g., melodic and rhythmic variations) observed in the improvisation achievement of the participants have been attributed to the influence of certain variables mentioned above (e.g., technical facility and aural imitation ability). The variables demonstrating statistically significant changes from novice to intermediate to advanced (i.e., across all groups) can be shown on a developmental continuum for improvisation achievement.

In Table 5.1 below, I have expanded the developmental continuum outlined in Chapter 2 by adding the results of my data analysis. The top of the table replicates the information from Chapter 2 concerning the developmental tendencies of improvisers; the bottom part of the table represents those variables that demonstrated statistically significant changes across all groups.

Although not depicted in the continuum due to a lack of statistical significance across all groups, the variables confidence, self-assessment, and jazz theory knowledge do play a role in the developmental process. Further studies of these variables are necessary to see if and how they might fit in the continuum.

As mentioned previously, the novice, intermediate, and advanced ability levels were derived from the three groups of participants based on their improvisation achievement scores. There are likely additional perspectives and degrees of differentiation among the participant population to be considered for studying jazz improvisation development. As Koopman (1995) states, “The [levels] reconstructed in the logic [i.e., sequence] part of developmental theory are abstract in nature. They are not necessarily found in concrete form in empirical reality, and they do not correspond to specific ages in human life” (p. 52). Therefore, this model should be considered preliminary and exploratory, while additional studies are recommended for bolstering or refuting the suggestions made here.

Table 5.1

Developmental Continuum of Instrumental Jazz Improvisation Achievement

<div> <div>Novice</div> <div>Intermediate</div> <div>Advanced</div> </div>			
<p>Explores sound production, occasionally inserting motives/ideas based on prelearned models and formulas</p> <p>Develops efficiency, fluency, flexibility, capacity for error correction, expressiveness, inventiveness, and achievement of coherence</p> <p>Synergy of conscious and subconscious processes; ability to play what is heard internally and instantaneously</p>			
<p>Controlled-processing, little or no hyperconnections between knowledge base, intuition, motor skills</p> <p>Enriches knowledge base, increases memory, experiences instances of flow state, develops multiple solutions to musical problems</p> <p>Automatic processing, flow state, ability to go beyond cognitive boundaries and constraints, hyperconnectivity between processing and motor skills</p>			
	Novice	Intermediate	Advanced
Aural Imitation	<ul style="list-style-type: none"> Limited due to weak connection with technical facility and limited knowledge base Largely based on external sources Limited and restrained 	<ul style="list-style-type: none"> Develops with technical facility Regularly includes both internal and external sound sources 	<ul style="list-style-type: none"> Automatic and fluent in replicating what is heard internally and externally
Technical Facility	<ul style="list-style-type: none"> Limited and restrained 	<ul style="list-style-type: none"> More fluent Enables greater realization of musical thoughts (internal sound source) 	<ul style="list-style-type: none"> Hyperconnectivity between processing and motor skills
Rhythm/Time Feel	<ul style="list-style-type: none"> Inconsistent Limited ability to play atop the time feel Largely unaware of various time feels 	<ul style="list-style-type: none"> Performs with consistency (styles) Demonstrates awareness of multiple time feels (styles) 	<ul style="list-style-type: none"> Consistently plays atop the time feel Able to play fluently in multiple time feels (styles)
Melodic/Rhythmic Ideas	<ul style="list-style-type: none"> Limited ability for creating melodic lines Frequent repetition of patterns 	<ul style="list-style-type: none"> Creates melodic lines based on growing knowledge base Some motivic development Solid eighth note lines Begins to play with more rhythmic variation (e.g., triplet figures, 4 to 1 patterns) 	<ul style="list-style-type: none"> Consistently creates new melodies and variations Shapes melodic lines Solid eighth note lines as well as complex rhythmic patterns (e.g., 3 against 2)
Harmonic Knowledge	<ul style="list-style-type: none"> Some use of chord tones 	<ul style="list-style-type: none"> Regular use of chord tones Some use of extensions and substitutions 	<ul style="list-style-type: none"> Regular use of chord tones as well as extensions and substitutions
Style	<ul style="list-style-type: none"> One-dimensional approach to articulation, tone, rhythm and feel from one style to the next 	<ul style="list-style-type: none"> Multi-dimensional approach (awareness of different feels) Uneven abilities across styles 	<ul style="list-style-type: none"> Fluent, multi-dimensional approach to playing in many styles
Expressivity	<ul style="list-style-type: none"> Lack of sensitivity towards space Leaves little room for rests or adds too many rests 	<ul style="list-style-type: none"> Demonstrates growing understanding of space Allows musical thoughts to emerge organically Responds to accompaniment 	<ul style="list-style-type: none"> Demonstrates full awareness of space and accompaniment Is able to consistently successfully build and release tension while soloing
Creativity	<ul style="list-style-type: none"> Performs minimally coherent ideas 	<ul style="list-style-type: none"> Original, coherent ideas begin emerging 	<ul style="list-style-type: none"> Original improvisation

As the continuum suggests, improvisation development is dependent on a continuous, amalgamative process encompassing a wide variety of skills. Regular practice and participation in improvisation help in the overall development of achievement.

Implications

The results of this study suggest several implications for the teaching and learning of instrumental jazz improvisation. Of utmost importance is the development of aural imitation and technical facility on one's instrument. Sometimes referred to as ear to hand coordination, this skill can be developed through regular practice playing by ear. Unfortunately, this practice is often neglected or seldom utilized in traditional instrumental music education (e.g., band class), where reading notation is emphasized. Musicians can develop great technical facility by reading notation, but are also capable of developing such skill through aural imitation. The combination of aural imitation with technical facility enables the musician to improvise what s/he hears internally and externally. Music teachers are therefore encouraged to include more aural imitation activities to develop this skill.

There are many ways to develop aural imitation ability, a few of which are suggested here. Novice improvisers can participate in call and response activities utilizing short idiomatic phrases (e.g., swing style). As their skill increases, they can listen to excerpts of authentic jazz recordings and repeat what is heard. Alongside imitating what is heard externally, improvisers of all abilities should practice internally hearing a freely conceived musical phrase and performing it. This is

important for developing the musical thinking process in jazz improvisation. Over time and through consistent practice, a sense of fluency and fluidity will develop in the ability to imitate what is heard externally and internally. This is the emergence of hyperconnectivity in improvisation.

Another significant byproduct of developing aural imitation ability using authentic recordings or playing with other jazz musicians is the simultaneous development of the other musical characteristics noted in the continuum (i.e., technical facility, rhythm/time feel, melodic/rhythmic ideas, harmonic knowledge, style, expressivity, and creativity.) By listening and imitating what is heard, improvisers are internalizing the jazz vernacular and building their knowledge base. This wide storehouse of knowledge becomes rich with procedural and declarative cognition, facilitating more possibilities when improvising. Thus, regularly playing with recordings and with others in a live setting is beneficial for developing improvisation achievement.

Although jazz theory did not turn out to be a significant predictor of jazz improvisation achievement in this study, it demonstrated a strong, positive correlation with it. Learning jazz theory alongside aural imitation practices may be considered an added help to developing improvisation expertise. Teachers are encouraged to discuss chord spellings, song forms, and harmonic progressions (e.g., ii – V – I) when teaching improvisation.

The results of this study support the claim that as jazz improvisation achievement increases, confidence in one's ability to improvise increases. Where this occurs on the continuum is unclear, but there was a significant change between

novice and advanced levels. This finding makes sense given that with more experience and success comes a greater a sense of self-efficacy. This is an important part of what drives musicians to continue improvising, leading to the potential for further development. Improvisation instructional strategies and experiences should therefore aim to build confidence levels in addition to targeting specific skills (e.g., mastering a particular harmonic pattern).

Similarly, as improvisation achievement increases, the ability to assess one's performance increases. Again, where this occurs on the continuum is unclear, but a significant change was noted between novice and advanced levels. This is an important skill for music teachers to help students develop due to the complexity of improvisation as a musical practice and the goal of each improviser to develop his/her own voice. How a person approaches developing their improvisation ability is dependent on many factors, not least of which is that person's unique set of musical skills and particular learning style. Music teachers should help improvisers to recognize their own particular strengths and weaknesses and suggest ways to promote and improve them.

Improvisation experience and jazz experience were found significantly correlated with improvisation achievement. It is important for music teachers to encourage and promote regular improvisation practice in jazz rehearsals and performances. Infrequent focus on improvisation, particularly in large jazz ensembles, does little to help students develop their abilities. Time on task, engaging in improvisation, is key to development. Providing students with tools, such as jazz theory knowledge and aural imitation ability, while articulating how they can be

utilized for creating improvised music, will help them to develop confidence and understand the process.

Recommendations for Future Research

Due to the exploratory nature of creating a continuum for improvisation development, it would be helpful for future studies to confirm or refute the model based on similar data gathering and analyses. If the model can be confirmed, perhaps more can be added to it. For example, future research should investigate if discrete stages of development exist and how they can be represented in the model. In addition, researchers should analyze factors that facilitate movement from one level to the next. Are there specific skills, e.g., aural imitation, that should be emphasized more than others? Can one discern a hierarchy of skills needed for advancement on the continuum? Studying a larger population of improvisers at both high school and college levels might be helpful in determining which variables are key movers in the development of improvisation achievement.

This study determined that the variables confidence, self-assessment, and jazz theory knowledge do play a role in the developmental process. Future studies should further explore the relationship these have to improvisation achievement to see if and how they might fit on the continuum. The design and testing of new forms of measurement for these variables is recommended.

In studying self-assessment, what particular strategies are helpful in creating awareness of one's strengths and weaknesses? What is the relationship between self-awareness and evaluative monitoring (Norgaard, 2011)? Do improvisers with

higher capabilities for evaluative monitoring lead to greater states of flow? How might this be represented in the developmental continuum?

Although singing and playing a secondary instrument did not correlate with improvisation achievement in this study, future studies should examine these variables. Many jazz pedagogues use scat singing and other forms of vocalization to audibly produce their musical thoughts. Because most people are intimately connected with their own voice, it is often easier to sing what one is hearing before playing it on an instrument. A future study might examine the use of scat singing or vocal improvisation as an intermediary step to instrumental improvisation. Similarly one might investigate the effects improvising on secondary instruments (e.g., woodwind doublers) has on improvisation development. Does practice on multiple instruments aid one in developing expertise any more or less than practice on a single instrument? What kinesthetic/motor skill developments occur when improvising on multiple instruments? How does tactile manipulation of an instrument influence one's approach to improvising?

Previous research has studied expert improvisers' analysis of their own performances. What can improvisers at other levels tell us about their creative process? What other distinctive characteristics define an "intermediate level" of improvisation achievement?

Finally, what more can be learned about aural imitation ability and its relationship to improvisation achievement? In this study, participants demonstrated unique and diverse understandings of what they heard through the Aural Imitation Measure (AIM). Like professional jazz musicians, some demonstrated the ability to

hear a phrase and create a variation to it, due to its length and challenge to their memory. This prompts questions regarding memory and perception and the role they play in improvisation achievement. Future studies should investigate these variables more closely.

Conclusion

This study was inspired by a single question: How does a jazz musician develop the ability to improvise? As a classical musician with a passion for jazz, I have earnestly pursued learning how to improvise in the jazz idiom. Along the way, I have marveled at how some musicians seem to effortlessly develop their improvisation abilities while others, like myself, must labor in a variety of ways (i.e., playing with recordings, studying transcriptions, learning jazz theory, etc.) for an extended period of time to reach some sort of success and satisfaction. Having had success in the classical idiom, I felt I had many of the characteristics necessary for success in the jazz idiom. However, the classical idiom rarely provides regular opportunities for improvisation and thus, my understanding of how to develop my improvisation expertise in the jazz idiom was limited. Such curiosity inspired this study.

Additionally, as a director of middle and high school jazz ensembles, I wanted to understand the developmental process of learning how to improvise in order to create specific teaching strategies to meet the needs of my students. It is my belief that far too many jazz ensemble directors in secondary education forego teaching improvisation. Many claim they are not comfortable or knowledgeable about it or simply do not have enough time to teach it. Often I see these directors feature select

soloists who require little guidance because of their intuitive approach to the process or they ask their soloists to rely on the written solos found in many jazz ensemble arrangements. Unfortunately, this is a disservice to learning and understanding jazz. If the heart of jazz is improvisation, I believe jazz directors have an obligation for making improvisation a core component of their instructional program.

To that end, the Developmental Continuum of Instrumental Jazz Improvisation Achievement may serve as an important tool for evaluating students' improvisation abilities and help determine what skills and knowledge bases need further development. There is an abundance of instructional materials available that target specific categories found in the model. For example, if a student demonstrates limited harmonic knowledge, there are many theory books and jazz method books that can help students develop this. Likewise, if students are struggling with coming up with melodic and rhythmic ideas, there are myriad books on jazz patterns and sequences that improvisers can put to memory for later use. Also, dedicating time to listening to recordings to immerse one's ears in the idiom will positively impact many categories in the model. By critically listening to students' improvisations and determining where they are in a given category, music teachers can choose an appropriate curriculum or instructional sequence for facilitating growth in students' improvisation abilities.

As this study confirms, jazz improvisation is a complex, multidimensional process. It is clear that aural imitation ability and technical facility are key components of jazz improvisation achievement and should be major areas of

concentration when learning how to improvise. Viewing improvisation achievement from a developmental perspective is helpful in identifying particular skills and characteristics that contribute to higher levels of achievement. It is my hope that future researchers will continue studying this topic, providing new insights for teachers and students involved in its practice.

Appendices

Appendix A

Participant Improvisation Experience Survey (PIES)

<https://docs.google.com/spreadsheet/viewform?formkey=dEt0U...>

Participant Improvisation Experience Survey (PIES)

The Participant Improvisation Experience Survey is used to gather information about you and your musical background. Specific identifying information (i.e., name) will not be gathered. Please respond to the following questions by selecting the choice that best answers the question. In some cases, more than one answer is requested. Thank you for your participation.

What is your current level of education?

- ☐ High School
- ☐ College

What is your current year in your level of education?

- ☐ First Year
- ☐ Second Year
- ☐ Third Year
- ☐ Fourth Year
- ☐ Fifth Year

What is your age?

- ☐ 13
- ☐ 14
- ☐ 15
- ☐ 16
- ☐ 17
- ☐ 18
- ☐ 19
- ☐ 20

- ☐ 21
- ☐ 22
- ☐ 23+

What is your gender?

- ☐ Male
- ☐ Female

What is your primary instrument when playing jazz music?

Choose one.

- ☐ Flute
- ☐ Oboe
- ☐ Clarinet
- ☐ Saxophone
- ☐ Bassoon
- ☐ Trumpet
- ☐ French Horn
- ☐ Trombone
- ☐ Baritone/Euphonium
- ☐ Tuba
- ☐ Upright/Electric Bass
- ☐ Piano
- ☐ Guitar
- ☐ Vibes

What other instrument(s) do you play?

Check all that apply.

- ☐ Flute
- ☐ Oboe
- ☐ Clarinet
- ☐ Saxophone
- ☐ Bassoon
- ☐ Trumpet
- ☐ French Horn
- ☐ Trombone

- ☐ Baritone/Euphonium
- ☐ Tuba
- ☐ Upright/Electric Bass
- ☐ Piano/Organ
- ☐ Guitar
- ☐ Keyboard Percussion (Vibes, Bells, Marimba, Xylophone)
- ☐ Drums
- ☐ Violin
- ☐ Viola
- ☐ Cello
- ☐ Harp
- ☐ None. I do not play another instrument
- ☐ Other:

How often do you play your "other" instrument(s)?

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

How often do you sing? (publicly or privately)

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

How many years have you played in a jazz ensemble?

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years

- ☐ 5 years
- ☐ 6 years
- ☐ 7 years
- ☐ 8 or more years

What is the total time you have studied/spent time learning to improvise?

Choose one, counting the current year as one year.

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 years
- ☐ 6 years
- ☐ 7 years
- ☐ 8 years
- ☐ 9 years
- ☐ 10 years
- ☐ 11 years
- ☐ 12+ years

How often do you practice improvising?

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

How often do you improvise on your "other" instruments?

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

How often do you improvise when you sing? (publicly or privately)

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

What is your approach to learning improvisation?

Check all that apply. If choosing "other", please explain.

- ☐ Listening to and playing along recordings
- ☐ Practicing scales
- ☐ Studying jazz theory
- ☐ Improvising to play-along recordings
- ☐ Jamming with my friends outside of school
- ☐ Studying improvisation with a teacher
- ☐ Transcribing jazz solos
- ☐ Learning to play melodies and licks in all keys
- ☐ Memorizing licks or riffs
- ☐ Improvising in a school jazz band or combo
- ☐ Taking a class in improvisation
- ☐ Playing at jam sessions
- ☐ Playing with professional jazz ensembles
- ☐ Other:

How often do you listen to jazz recordings?

Choose one.

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Seldom
- ☐ Never

What challenges or difficulties do you experience when improvising?

Check all that apply. If choosing "other", please explain.

- ☐ Having the instrumental technique to play what I hear in my head
- ☐ Being able to keep track of where I am in the song
- ☐ Being able to play by ear
- ☐ Playing the correct chord changes
- ☐ Feeling comfortable and confident
- ☐ Being able to listen to what I'm playing and making decisions about what to play next
- ☐ Feeling a sense of satisfaction when improvising
- ☐ Listening to and communicating musically with people around me
- ☐ Playing from memory
- ☐ Being able to read chord changes
- ☐ Knowing a wide variety of jazz songs
- ☐ Having enough musical ideas to play a longer solo
- ☐ Other:

In general, how confident do you feel when improvising?

Choose one.

- ☐ Very confident
- ☐ Confident
- ☐ Moderately confident
- ☐ A little confident
- ☐ Not confident

How would you rate yourself as an improviser?

Choose one.

1 2 3 4 5 6

Beginner ☐ ☐ ☐ ☐ ☐ ☐ ExpertPowered by [Google Docs](#)[Report Abuse](#) - [Terms of Service](#) - [Additional Terms](#)

Appendix B

Word Bank

Inexperienced
Fluid
Technical
Limited
Beginner
Intermediate
Advanced
Expert
Prolific
Repetitive
Rhythmic
Licks
Patterns
Transcends
Intuitive
Mechanical
Motivic
Organic
Coherent
Stylistic
Constrained
Swings
Facility
Flow
Fluent
Flexible
Versatile
Motivic
Rudimentary
Conception
Expressive
Synchronous
Originality
Singing
Square
Embellish
Full range
Limited range
Dynamic
Creative

Listener
Large vocabulary
Limited vocabulary
Confident
Spontaneous
Grooves
Rushes
Phrases
Articulation
Imaginative
Harmonic understanding
Melodic
Lyrical
Vibrato
Inventive
Virtuosic
Aural acuity
Character
Blues
Modal
Plays the changes
Staccato
Syncopation
Inflection/Timbre
Product-oriented
Process-oriented
Stylistic
Structural

Categories

Technique

- Fluid
- Limited
- Constrained
- Fluent
- Facility
- Versatile
- Full range
- Virtuosoic

Rhythm/Time Feel

- Grooves
- Swings
- Flow
- Rushes
-

Harmony

- Plays the changes
- Harmonic understanding
- Substitutes chord changes

Melodic/rhythmic development

- Melodic
- Patterns
- Licks
- Motivic
- Repetitive
- Large knowledge base
- Phrasing
- Structure
- Aware of form

Style

- Technical
- Repetitive
- Spontaneous

Expressivity

- Emotion
- Character
- Lyrical
- Aural acuity
- Singing
- Articulation

Creativity

- Prolific
- Originality
- Transcends constraints
- Inventiveness
- Intuitive
- Imaginative

Appendix C

Item Pool

Based on the recordings provided, please answer to what extent you agree with the following statements:

(1 = Strongly Disagree.....6 = Strongly Agree)

Technique

The soloist demonstrates a fluid performance technique.
The soloist demonstrates a limited performance technique.
The soloist demonstrates fluent performance technique.
The soloist demonstrates a constrained performance technique.
The soloist shows great facility on his/her instrument.
The soloist is versatile on his/her instrument.
The soloist uses the full range of the instrument.
The soloist uses a limited range of the instrument.
The performance is virtuosic.

Rhythm/Time Feel

The soloist plays with a good groove.
The soloist rushes when soloing.
The soloist plays with good time.
The soloist drags and plays behind the beat.
The soloist floats atop the time feel with limited rhythmic definition

Harmony

The soloist plays within the changes.
The soloist demonstrates harmonic understanding.
The soloist demonstrates advanced harmonic understanding, such as adding chord substitutions, chord extensions, and alterations.

Melodic/rhythmic development

The soloist creates melodic solo lines.
The soloist uses patterns when improvising.
The soloist uses licks or riffs when improvising.
The soloist uses motivic development in his/her solo.
The soloist uses repetition in his/her solo.
The soloist demonstrates a rich knowledge base of ideas.
The soloist demonstrates good phrasing.
The soloist demonstrates awareness of a larger structural plan for the solo.
The soloist sustains solid eighth note lines.

Style

The soloist performs articulations appropriate for this style.
The soloist's tone is representative of this style.

Expressivity

The soloist plays with emotion.
The soloist plays with a sense of character.
The soloist plays in a lyrical style.
The soloist plays in a non-expressive, technical style.
The soloist responds to inflections and ideas heard in the accompaniment.
The soloist plays a solo that is "singing".
The soloist plays with a variety of articulations.
The soloist plays with a wide dynamic range.
The soloist demonstrates sensitivity towards use of space.

Creativity

The soloist is a prolific improviser.
The soloist demonstrates originality in his/her improvisation.
The soloist is able to transcend stylistic constraints.
The soloist is imaginative in his/her improvisation.
The soloist demonstrates an intuitive sense when improvising.

Appendix D

Improvisation Achievement Performance Measure Pilot

The objective of this evaluation tool is to measure the improvisation characteristics and ability of the performer based on three improvisation tasks. You will listen to three improvisation performance tasks performed by an instrumentalist: (a) Improvisation to the sound of a drone, (b) two choruses of F blues with accompaniment, and (c) two choruses of "Blue Bossa" by Kenny Dorham. After listening to all three tasks, please answer to what extent you agree with the statements below. (Please note: Any evidence the performer provides (e.g., double time feel) in one or more tasks, should be considered a characteristic of their ability.) When the evaluation is complete, categorize the overall improvisation ability of the performer.

Evaluation Scale

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Technique

1) The soloist demonstrates great facility on his/her instrument.

1 2 3 4 5 6

2) The soloist demonstrates limited facility on his/her instrument.

1 2 3 4 5 6

Rhythm/Time Feel

4) The soloist plays in a groove with the recording.

1 2 3 4 5 6

5) The soloist consistently rushes when soloing.

1 2 3 4 5 6

6) The soloist plays with good time.

1 2 3 4 5 6

7) The soloist consistently drags and is not able to keep up with the music.

1 2 3 4 5 6

8) The soloist demonstrates rhythmic definition while floating atop the time feel.

1 2 3 4 5 6

9) The soloist plays with a variety of rhythmic ideas.

1 2 3 4 5 6

10) The soloist demonstrates double time feel in his/her solo(s).

1 2 3 4 5 6

Harmony

11) The soloist plays within the changes.

1 2 3 4 5 6

12) The soloist demonstrates harmonic understanding by playing inside and outside the chord changes.

1 2 3 4 5 6

13) The soloist demonstrates advanced harmonic understanding by regularly adding chord substitutions, chord extensions, and alterations.

1 2 3 4 5 6

Melodic/rhythmic development

14) The soloist creates melodic solo lines.

1 2 3 4 5 6

15) The soloist uses patterns when improvising.

1 2 3 4 5 6

16) The soloist uses licks when improvising.

1 2 3 4 5 6

17) The soloist uses motivic development in his/her solo.

1 2 3 4 5 6

18) The soloist uses melodic and/or rhythmic repetition in his/her solo.

1 2 3 4 5 6

19) The soloist demonstrates a rich knowledge base of ideas.

1 2 3 4 5 6

20) The soloist demonstrates phrasing that is logical.

1 2 3 4 5 6

21) The soloist demonstrates awareness of an architectural plan for solos.

1 2 3 4 5 6

22) The soloist sustains solid eighth note lines.

1 2 3 4 5 6

Style

23) The soloist performs articulations appropriate to a song's style.

1 2 3 4 5 6

24) The soloist's tone is representative of a song's style.

1 2 3 4 5 6

25) The soloist's rhythmic feel is appropriate for a song's style.

1 2 3 4 5 6

Expressivity

26) The soloist plays with emotion.

1 2 3 4 5 6

27) The soloist plays with distinctive character.

1 2 3 4 5 6

28) The soloist plays in a lyrical style.

1 2 3 4 5 6

29) The soloist plays in a non-expressive, technical (i.e., mechanical) style.

1 2 3 4 5 6

30) The soloist responds to the accompaniment.

1 2 3 4 5 6

31) The soloist plays with a variety of articulations.

1 2 3 4 5 6

32) The soloist plays with a wide dynamic range.

1 2 3 4 5 6

33) The soloist demonstrates sensitivity towards use of space.

1 2 3 4 5 6

Creativity

34) The soloist demonstrates originality in his/her improvisations.

1 2 3 4 5 6

35) The soloist is able to transcend stylistic constraints (e.g., play outside the changes, super-impose a different rhythmic feel or style).

1 2 3 4 5 6

36) The soloist creatively uses material of other improvisers (i.e., from recordings).

1 2 3 4 5 6

37) The soloist is an inventive improviser.

1 2 3 4 5 6

Please rate the overall improvisation ability of this performer:

1 2 3 4 5 6

Novice -----Intermediate----- Expert

Appendix E

Improvisation Achievement Performance Measure (IAPM) Main Study

The objective of this evaluation tool is to measure the improvisation characteristics and ability of the performer based on three improvisation tasks. You will listen to three improvisation performance tasks performed by an instrumentalist: (a) Improvisation over the sound of a drone, (b) three choruses of F blues with accompaniment, and (c) three choruses of "Blue Bossa" by Kenny Dorham. After listening to all three tasks, please rate the performance using the criteria below. (Please note: Any evidence the performer provides (e.g., double time feel) in one or more tasks, should be considered a characteristic of their ability.) When the evaluation is complete, categorize the overall improvisation ability of the performer.

Evaluation Scale					
1	2	3	4	5	6
Very Limited-----Adequate-----Exemplary					

Using the scale above, rate the following:

Technique

1) The soloist's overall facility on his/her instrument

1 2 3 4 5 6

Rhythm/Time Feel

2) The soloist's ability to play with good time

1 2 3 4 5 6

3) The extent to which the soloist demonstrates rhythmic definition while floating atop the time feel

1 2 3 4 5 6

Harmony

4) The soloist's ability to play within the chord changes (primarily utilizing chord tones)

1 2 3 4 5 6

5) The soloist's ability to demonstrate advanced harmonic understanding by playing outside the chord changes by adding chord substitutions, chord extensions, and alterations

1 2 3 4 5 6

Melodic/rhythmic development

6) The soloist's ability to create melodic solo lines

1 2 3 4 5 6

7) The soloist's use of patterns and licks when improvising

1 2 3 4 5 6

8) The soloist's use of motivic development in his/her solo

1 2 3 4 5 6

9) The soloist's demonstration of a rich knowledge base of melodic and rhythmic ideas

1 2 3 4 5 6

10) The soloist's demonstration of awareness for shaping lines and performing logical phrases

1 2 3 4 5 6

11) The soloist's demonstration of solid eighth note lines

1 2 3 4 5 6

Style

12) The soloist's ability to perform articulations, tone, and rhythmic feel appropriate to a song's style

1 2 3 4 5 6

Expressivity

13) The extent to which the soloist's performance demonstrates passion and character

1 2 3 4 5 6

14) The soloist's demonstration of sensitivity towards use of space, including responding to the accompaniment

1 2 3 4 5 6

Creativity

15) The soloist's demonstration of originality in his/her improvisations

1 2 3 4 5 6

Please rate the overall improvisation ability of this performer:

1 2 3 4 5 6

Novice -----Intermediate----- Expert

Appendix F

Student Version in Bb

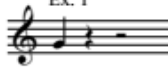
Aural Imitation Measure

The following aural imitation assessment contains 15 call and response items. You will hear a musical motive performed two times and have two opportunities to play back what you heard. The motive will be performed twice with rests in between equal to the length of the motive. A practice example will be provided.

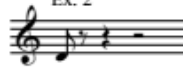
Practice Example



Ex. 1



Ex. 2



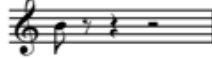
Ex. 3



5 Ex. 4



Ex. 5



Ex. 6



9 Ex. 7



Ex. 8



13 Ex. 9



Ex. 10



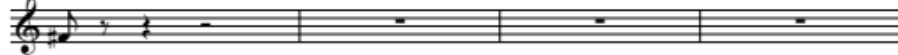
17 Ex. 11



21 Ex. 12



25 Ex. 13



29 Ex. 14



33 Ex. 15



Master in C

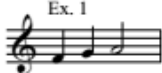
Aural Imitation Measure

The following aural imitation assessment contains 15 call and response items. You will hear a musical motive performed two times and have two opportunities to play back what you heard. The motive will be performed twice with rests in between equal to the length of the motive. A practice example will be provided.

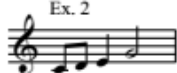
Practice Example



Ex. 1



Ex. 2

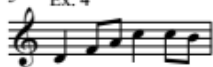


Ex. 3

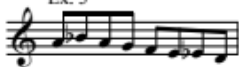


5

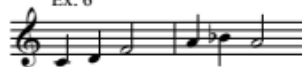
Ex. 4



Ex. 5

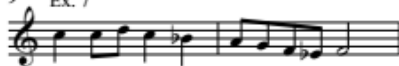


Ex. 6

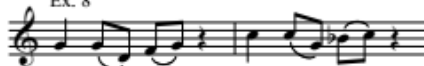


9

Ex. 7



Ex. 8



13

Ex. 9

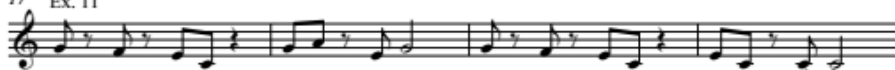


Ex. 10



17

Ex. 11



21

Ex. 12



25

Ex. 13



29

Ex. 14



33

Ex. 15



Appendix G

Jazz Theory Measure

This is an assessment of your jazz theory knowledge. Please circle the choice that best answers the question.

Chords

1. What is the correct spelling for CΔ7?
 - a. C Eb G Bb
 - b. C E G Bb
 - c. C E G B
 - d. C Eb G B

2. What is the correct spelling for F-7?
 - a. F A C Eb
 - b. F Ab C Eb
 - c. F A C E
 - d. F Ab Cb Eb

3. What is the correct spelling for DbØ7?
 - a. Db F Ab Cb
 - b. Db F A Cb
 - c. Db Fb Abb Cb
 - d. Db Fb A Cb

4. What is the correct spelling for A-7b9?

- a. A C# E G B
- b. A C E G Bb
- c. A C# E G Bb
- d. A C Eb G# B

5. What is the correct spelling for E7?

- a. E G B D
- b. E G# B D#
- c. E G Bb D
- d. E G# B D

6. What is the correct spelling for BbΔ7#11?

- a. Bb D F A E
- b. Bb Db F A Eb
- c. Bb D F Ab Eb
- d. Bb Db F A E

7. What is the correct spelling for G7b9?

- a. G B D F# A
- b. G B D F A
- c. G B D F Ab
- d. G Bb D F Ab

8. What is the correct spelling for B7sus?

- a. B D F# A B
- b. B A C# E
- c. B D# F# A B
- d. B A C E G

Form

9. What is the standard length for the blues form?

- a. 16 bars
- b. 24 bars
- c. 12 bars
- d. 8 bars

10. What is the standard form for “rhythm changes” (e.g., *I Got Rhythm*)?

- a. ABA
- b. AABA
- c. ABCA
- d. ABACA

Scales

11. Which of the following is an example of a Dorian scale?

- a. C D E F G A B C
- b. C Db Eb F Gb Ab Bb C
- c. C D Eb F G A Bb C
- d. C D E F G A Bb C

12. Which of the following is an example of a Bebop scale?

- a. D E F# G A B C C# D
- b. D E F G A B C D
- c. D E F# G# A B C# D
- d. D Eb F F# G A B C D

13. Which of the following is an example of a Lydian scale?

- a. A B C D E F G A
- b. A B C# D E F# G# A
- c. A B C# D# E F# G# A
- d. A B C D# E F G A

14. Which of the following is an example of a Whole Tone scale?

- a. F G Ab Bb C D Eb F
- b. F G A B C D E F
- c. F G Ab Bb C D Eb E F
- d. F G A B C# D# F

15. Which of the following is an example of a Diminished scale?

- a. C D Eb F Gb A Bb C
- b. C Db Eb E F# G A Bb C
- c. C D E F# G# A# C
- d. C D E F Gb Ab Bb C

II-V7-I Progressions

16. Which of the following contains the ii - V7 - I progression?

- a. D- | C#- | C- | F7#9
- b. BbΔ7 | EbΔ7 | Eb-
- c. D- | G- | C7 | FΔ
- d. F#Δ | D7#9 | G- | C-

17. Which of the following contains the ii - V7 - I progression?

- a. F7 | BbΔ | EbΔ | E-
- b. B- | E7#9 | AΔ | AΔ
- c. F | B- | E7 | F
- d. C7 | A- | Ab- | G-

18. Which of the following represents a correct spelling of the ii - V7 - I progression beginning on C?

- a. C7 | F7 | B7
- b. C-7 | F7 | B7
- c. C-7 | F7 | BbΔ
- d. C7 | F7 | Bb7

19. Which of the following represents a correct spelling of the iiØ7 - V7+9 - i progression beginning on G?

- a. G7 | C7#9 | F-7
- b. G-7 | C7#9 | F-7
- c. GØ7 | C7#9 | F-7
- d. GØ7 | C7#9 | FΔ

20. Which of the following represents a sequence of the ii-V progression?

- a. G-7 | C7 | C-7 | D7 | F-7 | Bb7
- b. C-7 | F-7 | BbΔ | EbΔ
- c. A7 | GΔ | C-7 | F7 | BbΔ
- d. G-7 | C7 | F-7 | Bb7 | Eb-7 | Ab7

Appendix H

Assent to Participate in a Research Study

AN ANALYSIS OF INSTRUMENTAL JAZZ IMPROVISATION DEVELOPMENT AMONG HIGH SCHOOL AND COLLEGE MUSICIANS

Principal Investigator: C. Michael Palmer, Ph.D. Candidate, University of Michigan

Faculty Advisor: Carlos Xavier Rodriguez, Associate Professor, University of Michigan

C. Michael Palmer invites you to participate in a research study about jazz improvisation. The purpose of this study is to construct a model for jazz improvisation development by examining the musical skills and characteristics of high school and college musicians learning jazz improvisation.

If you agree to be part of the research study, you will be asked to: (a) fill out a survey concerning your improvisation background and experience; (b) perform three short improvisations with accompaniment; (c) complete an aural imitation (call and response) test; and complete a jazz theory test. Total testing will take approximately 45 minutes and will be conducted in school while in session. The performance tests will be audio-recorded. No test data will be shared with your music teacher.

Benefits

Your participation in this study may help the researcher in creating a model for jazz improvisation development. Such a model will help music teachers better understand the skills and characteristics of jazz improvisation achievement at various levels.

Risks

There are no risks associated with this study because the data collected will be anonymized.

Confidentiality

We plan to publish the results of this study, but will not include any information that would identify you. There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including the University of Michigan.

To keep your information safe, the researchers will separate any data from identifying information and your name will not be recorded. The researchers will keep data securely stored on a personal computer. All audio files and written test results will be securely stored.

Voluntary nature of the study

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. If you decide to withdraw early, the data you initially provided will not be used in the final analysis.

Contact information

If you have questions about this research you may contact **C. Michael Palmer** (cmpalm@umich.edu) or **Carlos Rodriguez** (cxr@umich.edu).

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 540 E Liberty St., Ste 202, Ann Arbor, MI 48104-2210, (734) 936-0933 [or toll free, (866) 936-0933], irbhsbs@umich.edu.

Assent

By signing this document, you are agreeing to be in the study. You are also indicating that you have obtained permission from your parents, if under age 18 (separate form). You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

I agree to participate in the study.

Printed Name

Signature

Date

Consent to Audio Record

By signing below, you permit the researchers to audio-record your performance on the improvisation and aural imitation tasks.

Signature

Date

Appendix I

Permission to Participate in a Research Study

AN ANALYSIS OF INSTRUMENTAL JAZZ IMPROVISATION DEVELOPMENT AMONG HIGH SCHOOL AND COLLEGE MUSICIANS

Principal Investigator: C. Michael Palmer, Ph.D. Candidate, University of Michigan

Faculty Advisor: Carlos Xavier Rodriguez, Associate Professor, University of Michigan

C. Michael Palmer invites your son/daughter to participate in a research study about jazz improvisation. The purpose of this study is to construct a model for jazz improvisation development by examining the musical skills and characteristics of high school and college musicians learning jazz improvisation.

Your child's participation would involve the following: (a) filling out a survey concerning his/her improvisation background and experience; (b) performing three short improvisations with accompaniment; (c) completing an aural imitation (call and response) test; and completing a jazz theory test. Total testing will take approximately 45 minutes and will be conducted in school while in session. The performance tests will be audio-recorded. No test data will be shared with the child's music teacher.

Benefits

Your child's participation in this study may help the researcher in creating a model for jazz improvisation development. Such a model will help music teachers better understand the skills and characteristics of jazz improvisation achievement at various levels.

Risks

There are no risks associated with this study because the data collected will be anonymized.

Confidentiality

We plan to publish the results of this study, but will not include any information that would identify you or your child. There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including the University of Michigan.

To keep your child's information safe, the researchers will separate any data from identifying information and your child's name will not be recorded. The researchers will keep data securely stored on a personal computer. All audio files and written test results will be securely stored.

Voluntary nature of the study

Participating in this study is completely voluntary. Even if you give your child permission to participate now, you may change your mind and stop at any time. If you decide to withdraw your child early or if your child decides to withdraw early, the data provided will not be used in the final analysis. In addition, you may provide permission for your child to participate, but s/he may decline the invitation.

Contact information

If you have questions about this research you may contact **C. Michael Palmer** (cmpalm@umich.edu) or **Carlos Rodriguez** (cxr@umich.edu).

If you have questions about your child's rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 540 E Liberty St., Ste 202, Ann Arbor, MI 48104-2210, (734) 936-0933 [or toll free, (866) 936-0933], irbhsbs@umich.edu.

Consent

By signing this document, you are permitting your child to be in the study. You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

I give my child (name)_____ permission to participate in the study.

Printed Name

Signature

Date

Consent to Audio Record

By signing below, you are permitting the audio-recording of your child's performance on the improvisation and aural imitation tasks.

Signature

Date

Appendix J

Consent to Participate in a Research Study

AN ANALYSIS OF INSTRUMENTAL JAZZ IMPROVISATION DEVELOPMENT AMONG HIGH SCHOOL AND COLLEGE MUSICIANS

Principal Investigator: C. Michael Palmer, Ph.D. Candidate, University of Michigan

Faculty Advisor: Carlos Xavier Rodriguez, Associate Professor, University of Michigan

C. Michael Palmer invites you to participate in a research study about jazz improvisation. The purpose of this study is to construct a model for jazz improvisation development by examining the musical skills and characteristics of high school and college musicians learning jazz improvisation.

If you agree to be part of the research study, you will be asked to: (a) fill out a survey concerning your improvisation background and experience; (b) perform three short improvisations with accompaniment; (c) complete an aural imitation (call and response) test; and complete a jazz theory test. Total testing will take approximately 45 minutes and will be conducted in school while in session. The performance tests will be audio-recorded. No test data will be shared with your music teacher.

Benefits

Your participation in this study may help the researcher in creating a model for jazz improvisation development. Such a model will help music teachers better understand the skills and characteristics of jazz improvisation achievement at various levels.

Risks

There are no risks associated with this study because the data collected will be anonymized.

Confidentiality

We plan to publish the results of this study, but will not include any information that would identify you. There are some reasons why people other than the researchers may need to see information you provided as part of the study. This includes organizations responsible for making sure the research is done safely and properly, including the University of Michigan.

To keep your information safe, the researchers will separate any data from identifying information and your name will not be recorded. The researchers will keep data securely stored on a personal computer. All audio files and written test results will be securely stored.

Voluntary nature of the study

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. If you decide to withdraw early, the data you initially provided will not be used in the final analysis.

Contact information

If you have questions about this research you may contact **C. Michael Palmer** (cmpalm@umich.edu) or **Carlos Rodriguez** (cxr@umich.edu).

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 540 E Liberty St., Ste 202, Ann Arbor, MI 48104-2210, (734) 936-0933 [or toll free, (866) 936-0933], irbhsbs@umich.edu.

Consent

By signing this document, you are agreeing to be in the study. You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

I agree to participate in the study.

Printed Name

Signature

Date

Consent to Audio Record

By signing below, you permit the researchers to audio-record your performance on the improvisation and aural imitation tasks.

Signature

Date

Appendix K

Judging Panel Instructions

An Analysis of Instrumental Jazz Improvisation Development
Among High School and College Musicians

Dissertation by C. Michael Palmer, Ph.D. Candidate
University of Michigan

1. You should have one CD and 75 scoring sheets in your packet. (There are a few extra, should you need them.)
2. The CD contains individual tracks for each participant. Each track contains all three improvisations by each participant.
3. You will hear me announce each participant on each track. (The first two tracks are “anchor” examples, explained below.) Write down the number of the participant on the scoring sheet (IAPM). (PLEASE NOTE: On track 5, I announce “Participant #2”, but please write down “Participant #3”).
4. You will hear 70 participants, however the final participant number you hear is 71. (Participant 58 dropped out of the study.)
5. Read through the Improvisation Achievement Performance Measure (IAPM) scoring rubric *before* you begin listening to the CD. This will help you focus your attention on the various aspects of improvisation I am studying.
6. The first two tracks are “anchor” examples. The first example would represent a performance of a beginning improviser and receive 1 and 2 ratings. The second example would represent an advanced improviser, receiving 5 and 6 ratings. Keep these examples in mind as a baseline when rating each participant.
7. When finished with the evaluations, please place all scoring sheets and CD back in the packet and return it to me.

Thank you for your help and service to jazz and music education!

Appendix L

Band Director Letter

March 2012

Dear Band Director:

I am a Ph.D. student majoring in Music Education at the University of Michigan in Ann Arbor. I am currently working on my dissertation focusing on the development of instrumental jazz improvisation achievement among high school and college students. Knowing of your outstanding jazz program, I would like to ask if you would allow me to study the jazz improvisation abilities of some of your students. I have begun the formal review process for conducting research in your school district and am seeking your permission to conduct this research study at your school.

The purpose of this study is to construct a model for jazz improvisation development by examining the musical skills and characteristics of high school and college musicians learning jazz improvisation. Such a model will help music educators better understand the skills and attributes of jazz improvisers at various levels and enable them to make curricular and pedagogical decisions to promote learning of this complex practice.

To measure a students' jazz improvisation achievement, participants will take a brief survey of their improvisation experience, complete a jazz theory test, and perform an aural imitation test as well as three improvisation tasks. These tasks will be audio-recorded. The total time required for all four components will be approximately 45-minutes. I will arrange to meet with students during a class period and/or a time that is acceptable to you.

I am seeking participants with diverse experiences and abilities with jazz improvisation. This is important for constructing the developmental model. Your help in identifying students of various improvisation ability levels will be necessary.

The data collected for this study will neither include specific identifying information (e.g., student's name) nor be used in a way that identifies a particular student. The data will solely be used for understanding the developmental process of learning jazz improvisation.

Once I have received your permission and the permission of the school to conduct this study, I will provide you with consent and assent forms for potential participants to fill out. Thank you for your time. Should you have further questions, please do not hesitate to contact me.

Sincerely,

C. Michael Palmer, Ph.D. Candidate
School of Music, Theatre, & Dance
E.V. Moore Building
University of Michigan
Ann Arbor, Michigan 48109

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